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SOFT TISSUE INJURIES OF THE CERVICAL REGION

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THE NECK is a unique conduit which is extremely vulnerable to trauma. Despite the frequency of penetrating wounds of the neck in civilian as well as in military life, there has been controversy about the need for early surgical exploration. The possibility of multiple injuries in the neck does not permit standardization of surgical therapy, but the importance of early exploratory cervicotomy cannot be overemphasized. In spite of the advocation more than one hundred years ago of exploration of all wounds penetrating the platysma, bleeding neck wounds are still treated with pressure and hopeful observation.

The majority of accounts of soft tissue injuries of the neck have been reported by military surgeons (1, 11, 24, 43, 44, 45, 46, 74, 76, 79, 81). Three neck wounds were reported to have occurred in the Crimean War; two were fatal, the other resulted in invalidism. There were 4,114 cervical injuries reported in the Civil War, 15 per cent of which were fatal. During the Spanish American War, 188 neck wounds were described, with a mortality rate of 18 per cent; while during World War I, there were 594 cases reported with an approximate mortality rate of 11 per cent. More intelligent management of neck wounds was shown in World War II; one series of 851 cases had an over-all mortality rate of 7 per cent. Historically, two features in the development of the management of soft tissue injuries of the neck are outstanding. First, the importance of an adequate airway, wound debridement, and wound drainage was recognized; this treatment was common practice during the Civil War era. Second, the danger of hemorrhage resulting from expectant therapy of vascular injury was justifiably appreciated. During and after World War I, however, the great number of arterial aneurysms of the neck reported as delayed complications of neck wounds was evidence that expectant therapy had been employed too often.

The management of neck wounds in World War II improved because of refinements in surgical techniques, antibiotics, and anesthesia. Tracheostomy was employed earlier, and drainage and the administration of antibiotics for pharyngoesophageal wounds were instituted. Definitive therapy for vascular injury in order to restore continuity of the vessel was begun on a broader scale.

Tracheostomy is now a common surgical procedure; centuries ago, the performance of such an heroic act demanded a bold surgeon. This operation was first described just after the beginning of the Christian era. It was credited to

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Asclepiades in 124 B.C. and, even though performed infrequently, it has been described by almost all writers of surgical history from Paul of Aegina in 625-690 A.D. and Antyllus in the second century A.D. to the present time (28, 30, 68).

Brassavala performed the first tracheostomy in 1546. Goodall (28) in his treatise on tracheostomy reported only 28 recoveries prior to 1825. Even assuming that some obscure reports were not found and that cases went unreported, the number of procedures is pitifully small for a period of 200 years. As Goodall said, "It is appalling to think of the vast multitude of unhappy infants who must have fallen victims of laryngeal diphtheria from the Hippocratic era to well on in the nineteenth century." The increased prevalence of diphtheria in France in the first quarter of the nineteenth century was responsible for the final and convincing demonstration of the possibilities of tracheostomy by Bretonneau and Trousseau (68).

Tracheostomy for trauma undoubtedly had been used prior to 1620 when Habicot reported a case in which it was successfully performed on a 14 year old boy for a foreign body. In another instance, Habicot described the case of a boy wounded and left for dead; he opened the boy's trachea and removed a laryngeal blood clot. Habicot was also successful in 2 additional cases; 1 was an officer with a cut throat and the other, a young woman shot through the throat (28). In 1714, Detharding recommended that this operation be performed on persons who were apparently drowned (69).

The technique of tracheostomy has evolved from simple incision to early attempts at cannulation. The earliest cannulas were probably improvised out of quills; these were quickly followed by tubes of silver, gold, and lead. At first, these tracheostomy tubes were short and straight. Fabricius of Aquadente wrote in the sixteenth century (28) that the inserted tube should be short so that it would not touch the posterior wall of the trachea—which subsequent surgeons greatly feared—and not too wide, lest too much air should get into the lungs. Tubes, similar to present day cannulas, were then gradually fashioned to conform with the anatomic arrangement of the trachea. Apparently the double tube was evolved during Trousseau's time by two laymen whose identity has been lost (28).

Although obvious trauma to the deep structures of the neck presents problems because of the severity of the injury, the benign appearance of a small entry wound is often misleading with respect to the major injury which lies beneath the fibers of the platysma. Severe injury in the neck has been ascribed to a variety of agents including: bullets; shrapnel; knives; glass; self-inflicted wounds; burns; human bites; ice picks; high voltage electrical trauma; irradiation; blunt trauma; rope injuries; choking, both internal and external; a variety of injuries sustained in airplane, automobile, and sports accidents; and iatrogenic injuries to the pharynx, trachea, and esophagus.

The following four points should be considered as general principles of treatment for neck wounds: (1) maintenance of an adequate airway and the restoration of normal respiratory mechanisms, (2) adequate treatment for hypovolemia, (3) early exploratory cervicotomy with definitive surgical therapy, and (4) treatment of associated injuries.

The importance of early exploration has been emphasized by Fogelman and Stewart (24) who, in a series of 100 injuries of the neck, reported early exploration in 83 patients with a 6 per cent mortality rate. Among 17 patients in whom no exploration was carried out, the mortality rate was 35 per cent. There was a 4 per cent mortality rate in the patients who underwent exploratory operation within 6 hours; in those who underwent operation after 6 hours, the mortality rate was 20 per cent. Many neck wounds which appear to be slight are fatal either immediately or shortly after injury. If, however, the patient survives long enough to receive adequate attention, even the severest of wounds may be cared for successfully. Therefore, an injury to the neck is never slight enough to be neglected nor extensive enough to be regarded as hopeless.

EVALUATION AND FIRST AID TREATMENT

The Committee on Trauma of the American College of Surgeons (2) has emphasized the following factors in the first aid treatment of acute injuries to the neck:

1. Apply sterile dressing of adequate size, shape, and volume to cover the wound, prevent flow of blood, and avoid further contamination.

2. Fix the dressing in place with adhesive tape or with a bandage which is anchored about the head, jaw, or opposite axilla.

3. If loss of blood has already resulted in shock, give one or two pints of blood substitute or whole blood as soon as possible.

4. Direct the patient immediately to an emergency aid room or hospital for further examination and treatment.

5. Do not tamper with the wound, remove foreign bodies, or disturb blood clots.

The following questions will help to classify the patient's injury: Is respiratory obstruction present, impending, or likely? Is there vascular injury with external or internal hemorrhage? Is there an injury to the cervical cord, or is such an injury likely? Is there a foreign body lodged in the neck? Is there an injury to the pharynx or esophagus? Is there an injury to the head above or to the chest below the neck wound? Does the patient have other injuries requiring special care?

Constricting bandages should not be applied to the neck to control hemorrhage or edema in any patient who is unconscious, or who may become so after medication or a surgical procedure, unless someone is in constant attendance to prevent strangulation. It is often advisable to transport these patients in the lateral decubitus or prone position with the head slightly dependent when tracheal or esophageal injuries may lead to the fatal aspiration of secretions, vomitus, or blood. During transport, it is advisable to have available some type of suction apparatus for aspirating secretions from the nasopharynx. The apparatus can be as simple as an Asepto syringe and catheter. A small suction machine, however, is more efficient. The wound should be covered with a sterile dressing of appropriate size and the patient transported to a hospital where the personnel and equipment necessary for the care of such wounds are available. Even in the well equipped emergency room, probing of neck wounds and the removal of blood clots should not be done unless a surgeon is prepared to control severe hemorrhage, and unless there is a supply of blood sufficient to prevent or overcome shock. The urgent case must be cared for promptly.

Since a free airway is imperative, respiratory obstruction should be evaluated carefully. Obstruction may result from aspiration of blood or a foreign body, direct trauma to the larynx or trachea, edema resulting from injuries to adjacent structures in the neck or floor of the mouth, and increased pressure because of hemorrhage from a large or small vessel. Respiratory obstruction, when impending or anticipated from the nature of the wound, warrants immediate hospitalization in order that a tracheostomy may be performed under favorable conditions. When strangulation is already present or developing rapidly, immediate tracheostomy is required. Performed soon enough, even under the most unfavorable circumstances, it may be life-saving. Inspiratory retraction at the suprasternal notch, the supraclavicular fossae, and the epigastrium demands immediate attention. The preparation of the skin for tracheostomy is carried out as for any elective procedure but the urgency of the situation may lead to curtailment of some of the steps customarily taken.

Small penetrating or perforating wounds associated with severance or perforation of large vessels may cause little or no external bleeding. The neck becomes swollen, however, because of an accumulation of blood in fascial spaces. This is commonly associated with difficulty in breathing because of increased pressure in the neck, but is not related necessarily to an intrinsic defect in the airway. There may be a change in the quality of the voice; it may be muffled or nasal. It is of value to distinguish between strangulation resulting from a defect in the airway and that resulting from internal tension in the neck. Decompression of fascial spaces by incision will relieve the respiratory difficulty but the bleeding point must then be controlled to avoid fatal hemorrhage.

TREATMENT OF SUPERFICIAL WOUNDS

Superficial lacerations involving the skin alone, such as those resulting from suicide attempts or minor accidents, can be treated in the same manner as any acute wound. The area is surgically cleansed and hairy areas are shaved. Under local anesthesia the wound is debrided of all devitalized tissue and irrigated thoroughly with normal saline solution.

After it is ascertained that no important structures are injured, the wound should be closed with the least number of interrupted nonabsorbable sutures necessary for approximation without tension. In larger wounds it is often advisable to insert a small thin rubber drain. If closures are made parallel to cervical creases or Langer's lines, a good cosmetic scar will result. Dressings and supportive bandages are then applied as indicated.

Tetanus antitoxin or tetanus toxoid and antibiotics should be given when the circumstances and nature of the wound warrant such treatment.

TREATMENT OF WOUNDS INVOLVING DEEPER STRUCTURES

Local anesthesia is adequate for the treatment of most superficial wounds; however, general anesthesia with intubation is preferable for exploration of deeper wounds. Atropine should be administered to inhibit secretions and reflex arrhythmias. Narcotics, because of their depressant effect on the respiratory center, should be withheld pending complete evaluation of the neck injury, particularly in those patients in whom there is any suspicion of airway obstruction with retention of carbon dioxide. Draping should allow a generous incision and the opportunity for extension if needed. During induction and the surgical procedure itself, air embolism should be considered and prevented by finger tamponade or ligation of veins. Both the surgeon and the anesthetist should be alert to any changes in respiratory patterns that may indicate the delayed onset of pneumothorax or hemothorax. Hypovolemia should be treated or prevented during the tedious exploration and surgical repair. The status of the vocal cords should always be determined before and after the operation.

Muscles. The muscles most often injured are the platysma, sternocleidomastoid, and the prethyroid groups although occasionally the scalene, omohyoid, and constrictors of the pharynx are damaged. When muscle injury is apparent, careful search should be made for damage to other vital structures in the area, particularly the large blood vessels and nerves. If no serious injury other than the muscle laceration is encountered, the muscles after debridement can be approximated loosely with interrupted nonabsorbable sutures. The sternocleidomastoid should be approximated carefully whenever possible to lessen disfiguration.

Veins. Superficial veins, because of their exposed position, are unusually susceptible to injury. If widely open, some of these veins may draw in air, causing air embolism. Pressure or packing will control this until clamping or ligation can be accomplished. Bailey (4), in his discussion of self-inflicted neck wounds, states that in more than half of the cases which need surgical aid the wound does not involve any vital structure. Only the skin, platysma, and perhaps other superficial muscles are severed. The external jugular and facial veins are the ones which are most often severed, and these vessels are easily ligated or treated by compression until ligature can be carried out. Of the deeper wounds, those self-inflicted by the right hand are usually deeper on the left side and in about 97 per cent of cases the air passages are opened. The thyroid vessels and internal jugular veins are injured frequently. Bleeding into the severed larynx or trachea is a common cause of death. Unless this is realized, packing a wound, which is a justifiable expedient in certain circumstances, may precipitate rather than prevent a fatal termination. Because the blood is being tamponaded there may be internal hemorrhage with aspiration into the trachea or pharynx. It is essential that all bleeding vessels be secured. There should be no hesitation in ligating the internal jugular vein above and below a wound of this vessel. It is rarely divided on both sides of the neck.

Arteries. When an injury to a large artery is suspected or actually present, manipulation of the wound should be avoided lest disturbance of a protective blood clot result in uncontrollable hemorrhage. The successful management of injuries to the large vessels requires blood replacement, endotracheal anesthesia, oxygen, and adequate assistance for exposure of the vessels. Control of the carotid, innominate, or subclavian arteries may be required to help locate and ligate other bleeding vessels. Appropriate instruments and adequate lighting are essential.

All of the smaller arteries can be ligated without fear of ischemia because of the extensive collateral circulation in the neck. Injuries to the common carotid artery and its main branches should be carefully evaluated and repaired if possible.

Whenever possible, the large artery or vein should be isolated below and above the bleeding point and tapes or blood vessel clamps applied to control hemorrhage. The injured segment of the vessel should be adequately exposed and cleansed of clot, loose tissue, and all foreign material. Closure of the arterial wound either by a fine continuous nonabsorbable suture or ligation with a braided silk transfixing suture close to the damaged segment should be effected.

Fogelman and Stewart (24) have described the most common vascular injuries in 44 pa-

tients. In 30 instances the jugular, innominate, or subclavian veins were injured and the jugular veins accounted for 23 of these injuries.

The restoration of continuity of the carotid artery should always be attempted and with lacerations made by a sharp instrument, adequate length of vessel is usually available. In dealing with gunshot injuries, however, intimal damage always extends beyond the area of trauma estimated by close inspection, and the blood vessels should be resected at least 1 centimeter beyond the area of gross external damage. This may often require a prosthetic replacement. One should be guided in the decision of whether or not to re-establish continuity of the vessel by the age of the patient and the extent of the injury. In cases in which there is a great deal of tissue necrosis resulting from a bullet wound or other severe injury, it may be judicious to ligate both ends of the severed carotid artery rather than attempt restoration of continuity. In other words, the risk of cerebral complications secondary to ligation may be of lesser importance than the risk of death from subsequent infection which may produce dissolution of the anastomosis and fatal hemorrhage.

Experience with carotid artery ligation has shown that the morbidity and mortality attending ligation are low in the young and increase progressively with age. The cerebral complications are often related to ascending thrombosis rather than to the initial ischemia. Lewis (45) recorded in 3 patients injuries to the common carotid artery which required ligation but did not result in cerebral or other complications. However, all 3 patients were young men. Traumatic thrombosis of the internal carotid artery has been reported. Schneider and Lemmen (72) and Murray (57) call attention to the nonpenetrating types of cervical injury producing thrombosis of the internal carotid artery which may be associated with neurologic manifestations simulating severe craniocerebral injury. In these injuries, internal carotid artery thrombosis simulates an epidural or subdural hematoma. If there is a penetrating wound of the neck, say these authors, traumatic internal carotid artery thrombosis is much more likely to be recognized, but if there is merely a contusion with a minor degree of swelling and ecchymosis, this diagnosis may be overlooked. In patients who present clinical signs and symptoms simulating those of acute head injury, the diagnosis of thrombosis of the internal carotid artery may be suspected when a combination of neurologic signs and trauma to the neck is observed. In the majority of cases with acute traumatic thrombosis of the internal carotid artery, the signs and symptoms may develop within a period of 6 to 24 hours. Thrombosis of the internal carotid artery may result in alterations in the state of consciousness, hemiplegia, aphasia, blindness, visual field defects, and death (17,35,57,61,72). Palpation of the vessels in the neck is of no value in the diagnosis of the process in the internal carotid artery. In the occluded artery, pulsations may be transmitted to the thrombosed segment from the patent portion. The presence of increased intracranial pressure with thrombosis of the carotid artery is now well recognized. Carotid arteriography is the most accurate method of diagnosing thrombosis of the internal carotid artery.

Constant observation of all patients with suspected carotid arterial injury and immediate institution of therapy are factors of paramount importance to success in the treatment of this serious lesion. If the diagnosis of thrombosis of the internal carotid artery can be made early by means of percutaneous arteriography, anticoagulant therapy may be of value in controlling the progression of the intravascular clot but it will not affect the thrombosis that has already taken place. Treatment in these cases should consist of either surgically extracting the clot or improving blood flow to the brain through collateral channels. This involves the inhibition of vasomotor tone or the abolition of vasoconstriction in the external maxillary and angular arteries. It should be remembered that when the internal artery is occluded or injured, collateral circulation through the circle of Willis from the opposite side may be adequate. When the common carotid artery is occluded, collateral circulation will occur between the inferior and superior thyroid arteries; between the deep cervical branch of the costocervical trunk and the descending branches of the occipital and vertebral arteries; and between the superior thyroid, lingual, facial, occipital, and temporal arteries and the corresponding arteries of the opposite side. With these extensive anatomic communications, it is obvious that ligation of the common carotid is less dangerous than ligation of the internal carotid artery. Dorrance (21) states that a certain percentage of cerebral

complications after carotid artery ligation is due to reduced blood supply resulting from anomalies of the circle of Willis. Cervical sympathetic blocks, suggested by Poppen (67), may be of value in overcoming vasospasm. Occasionally, excision of the thrombosed vessel has been performed. A dacron or teflon graft may be used to replace the excised segment. Recanalization of the thrombosed artery has been known to occur.

Trachea and air passages. Like a traumatic lesion elsewhere, a wound of the air passages may be in the form of a crush, contusion, incision, laceration, puncture, penetration, perforation, fracture, dislocation, or avulsion (22, 23, 36, 37, 38, 47, 49, 50, 52, 58, 64, 66, 70). The clinical features of laryngeal and tracheal injuries are usually determined by the type of wound. In laceration of the trachea, respiratory efforts permit the free ingress and egress of air through the wound and there may be associated bleeding both into the trachea and from the wound. Trauma due to a blunt instrument, however, or small stab wounds produce tracheal rupture or puncture with an intact skin or only a small cutaneous incision. In the latter case, respiratory distress and subcutaneous emphysema may be somewhat delayed. Subcutaneous emphysema and respiratory distress are the two most common manifestations of closed, stab, or puncture wounds of the trachea. The subcutaneous emphysema resulting from tracheal injuries has three characteristics. It begins in the neck, sometimes spreads with amazing rapidity, and occasionally extends to massive proportions. Blunt trauma to the trachea and larynx may result in disruption of continuity of the airway passage by fracture or dislocation of the cartilaginous structures, and it may also produce laryngeal edema or a hematoma. Painful swallowing is the most prominent symptom of a traumatic laryngeal hematoma. The pain is sometimes referred to the ear. Varying degrees of hoarseness may be present. An extensive hematoma may make breathing difficult and often the obstruction is marked enough to necessitate tracheostomy. Occlusion of the airway develops rapidly after hemorrhage in the neck and prompt tracheostomy is imperative. Unless the force applied to the larynx is sufficient to cause laceration of the mucosa of the larynx, expectoration of blood does not occur. Examination with a mirror reveals an ecchymotic area in that portion of the larynx containing the hematoma (70). The area may be sharply localized and, when it is managed expectantly, no permanent laryngeal damage results.

Fractures.—With fractures involving the hyoid bone and the larynx, a clinical diagnosis of the fracture can be made most of the time. Hyoid bone fracture is most apt to involve one of the greater cornua at or near the junction of the cornu with the body of the hyoid bone. Considerable displacement of the fragments without perforation into the pharynx is not unusual.

Fracture of the hyoid bone is recognized by the local findings of deformity, swelling, and discoloration; local pain on protruding the tongue or opening the mouth; dysphagia, dysphonia, and hoarseness; and persistent cough. Reduction of a fractured hyoid bone can be attempted by placing the finger of one hand on the floor of the mouth and then externally manipulating the fragment with the other hand.

When fractures of the thyroid or cricoid cartilages occur, the symptoms are similar but the pain on swallowing is usually more intense. Dyspnea and cyanosis are prominent features. Palpation will reveal anatomic displacement unless this is obscured by edema or severe hemorrhage into fascial planes.

A fracture of the larynx requires tracheostomy once the diagnosis has been established even though the dyspnea and cyanosis are not very marked. Manipulative reduction of the fragments can then be attempted. Although restlessness and anxiety accompany airway obstruction, it must be realized that any attendant dyspnea is compensatory for hypoxia and that its suppression by drugs can produce acute asphyxiation and death. Cyanosis cannot be used as an accurate indication of the degree of asphyxia for it may not appear until just before the death of the patient.

Tracheostomy.—In the past, most tracheostomies were performed to relieve obstruction of the airway caused by inflammatory conditions or neoplasms or were adjuncts to surgical procedures in the neck. Since acute injuries of rather severe degree are becoming much more common with our rapid modes of transportation, it should be remembered that tracheostomy is a useful procedure in many instances even though the face and neck are not injured (6, 15, 80). In recent years, the use of tracheostomy to

permit frequent and adequate cleansing of the lower respiratory tree has grown steadily.

Tracheostomy can be performed as an emergency or as an elective procedure. It is frequently possible to convert emergency conditions into elective ones by introducing an airway into the larynx. Elective tracheostomies are performed when an airway can be provided. The introduction of a bronchoscope, endotracheal tube, or a Mosher lifesaving tube through the larynx provides the patient with an airway and permits orderly tracheostomy to be carried out. It may be performed under local or general anesthesia.

Errors and accidents can occur easily while a tracheostomy is being performed. Too short an incision obscures exposure and prolongs the operation. After incision of the skin and superficial fascia, the strap muscles may not be separated in the midline, the surgeon may dissect too far laterally, and pneumothorax may be induced. The knife used to incise the trachea may be carried through the posterior wall of the trachea and into the esophagus. The cannula may fail to enter the tracheal lumen and may make a false passage anterior to the trachea. Entrance of blood into the trachea can be prevented by proper hemostasis unless the need for opening the trachea is urgent. Blood may be coughed out by the patient unless he is unconscious when the emergency tracheostomy is performed; if not coughed out, it should be sucked out carefully after introduction of the tube.

Postoperative complications include emphysema of the subcutaneous tissue and fascial layers of the neck. Emphysema is usually not serious. Pneumothorax may be fatal if it is bilateral and particularly if it is under tension. Careful search should be made for clinical signs of this condition. Laryngeal or tracheal stenosis should not follow a properly performed tracheostomy. Wound infections are rare. Recently, Davis, Kretchmer, and Bryce-Smith (18) reviewed the tracheostomies performed at the University and City Hospitals of Cleveland upon 151 patients during the 5 year period from 1948 through 1952. They found that the operation was being performed more frequently than in the past, but still usually as an emergency procedure. They stated that the newer concept of a planned elective prophylactic operation was being accepted with reluctance in many quarters. Anesthetists have come to recommend this operation more as a prophylactic measure than as an emergency treatment, not only because an airway is assured but also perhaps even more specifically because it provides an easy route to the lower respiratory tract for aspiration of secretions. In addition to relieving respiratory obstruction, the value of tracheostomy has recently become apparent in the following conditions: weakness of the respiratory muscles causing difficulty in removal of secretions by coughing; loss of voluntary control of the airway; and unconsciousness with an absence of weak cough reflex. They stressed the value of tracheostomy in head injuries, bulbospinal poliomyelitis, and in other conditions including diseases of the central nervous system, barbiturate intoxication, acute laryngotracheal bronchitis, trauma, and neoplasms involving the upper respiratory passages.

The cosmetic results were generally good in 84 per cent of the patients who could be followed up. Complete healing can be expected regardless of the length of time that a tracheostomy tube is left in place. Tracheostomies have been reported which have tended to close spontaneously after 70 years (18). In general, the tracheostomy opening should be below the first tracheal ring to avoid damage to the cricoid. If damage to the cricoid occurs and is not promptly repaired, glottic stenosis is a likely complication. A previous tracheostomy is not a contraindication to a second, and 5 of Davis' patients had repeated operations without any difficulty.

Pharynx and esophagus. The deep position of the esophagus behind the trachea protects it from most agents which injure other structures in the neck. Occasionally, however, it is injured and may produce contamination of the fascial planes of the neck with resulting mediastinitis. A stick or other object carried in the mouth is rarely rammed down the throat and forced through the pharyngeal or esophageal wall. More commonly, some foreign body such as a bone, pin, nail, or other sharp object becomes impacted in the esophagus and perforates the wall. The esophagus may be injured as a result of the injudicious use of a stomach tube or bougie in an attempt to dislodge a foreign body. Similarly, the forced passage of an esophagoscope or dilator through an area already weakened by infection may cause perforation (26).

Kerr, Sloan, and O'Brien (40) reported rupture of the esophagus by compressed air in a 3 year old boy who bit through an inner tube protruding from a tractor tire.

Rupture of the esophagus during emesis has been reported (20, 33, 51, 59) and perforation should be kept in mind when a patient complains of severe epigastric or left chest pain after vomiting. Derrick, Harrison, and Howard (20), in a study of fresh autopsy material, showed that the bursting strength of the intact human esophagus is approximately 3.0 to 7.5 pounds per square inch. Removal of the mucosa reduces this critical pressure to 1.0 to 2.25 pounds per square inch. Acute ulceration, therefore, can weaken the wall to such an extent that it is predisposed to rupture after even so minor a mechanical stress as vomiting. Spontaneous perforation of the esophagus has been reported primarily in association with diseases of the central nervous system, pyloric obstruction, or other lesions which cause chronic vomiting.

Esophageal perforation from whatever cause is a very serious matter. Escape of air from the site of injury into the loose areolar tissue in the neck causes rapidly spreading emphysema which carries pharyngeal and esophageal secretions, food particles, and bacteria through the tissue spaces. Dyspnea, rapidly developing swelling, tenderness, fever, leucocytosis, and tachycardia are manifestations of the spreading infection. A roentgenogram of the cervical region may reveal large amounts of air dissecting the fascial planes and may be of help in establishing the diagnosis. Although esophageal perforation was once considered a fatal condition, it is now recognized that prompt surgical intervention with removal of the foreign material, closure of the esophageal opening by suture, and establishment of free and adequate drainage of the upper mediastinum and fascial planes of the neck combined with antimicrobial therapy will save the majority of these patients.

The principles of therapy for wounds of the pharynx and esophagus include early diagnosis and surgical exploration, as with other wounds of the neck. The one outstanding symptom of wounds of the esophagus is painful deglutition, and this is far more intense than in wounds of either the larynx or the pharynx. The presence of this symptom, together with consideration of the injury, helps determine the diagnosis. The presence of blood in the pharyngeal or gastric aspirate in association with a penetrating neck wound is usually indicative of a pharyngoesophageal injury, but the blood may have come from the tracheobronchial tree. Accumulation of fluid or gas within the cervical mediastinum is almost always present. In certain less obvious injuries, the diagnosis may be made by the use of esophagoscopy or the instillation of radiopaque material (lipiodol) into the pharynx and esophagus. Simple lacerations and small defects of the pharynx are inaccessible for suturing satisfactorily; healing usually occurs with drainage of fascial spaces alone.

More destructive injuries of the esophagus and pharynx require extensive surgical procedures including debridement and repair of the defect. Primary anastomosis of the severed cervical esophagus with end-to-end anastomosis is now an acceptable procedure if carefully performed. Primary reconstruction may be considered even for large defects. If more extensive avulsions or wounds of the esophagus cannot be repaired initially by skin grafts or other plastic procedures, they can be corrected with subsequent procedures in order to restore the continuity of the pharynx and esophagus. Leech, Drum, and Osterhagen (44) reported on 20 patients with perforation of the pharynx, who were treated in military hospitals in World War II. The wounds were debrided and treated by layer closure. A soft rubber drain was placed temporarily down through the lateral side of the neck to the suture line in the mucous membrane. All of these wounds healed by primary intention. They reported the cases of 4 patients with perforating wounds of the cervical esophagus who were treated by suture, antibiotics, nasogastric suction, and intravenous feedings with or without tracheostomy. Drainage of all perforating wounds of the pharynx and esophagus is desirable as a routine measure. It may prevent the accumulation of secretions in subcutaneous tissues, abscess formation, and mediastinitis. Occasionally a persistent fistula or stricture may result. These can be repaired with subsequent surgical procedures. Nasogastric intubation is important. Gastrostomy and jejunostomy, if needed, should be performed promptly while the patient is in relatively good condition. In all injuries of the pharynx and esophagus antibiotic therapy is a necessary adjunct to surgical treatment.

Pleura. Occasionally the fact that the cervical structures contain the cupula of the pleura and the apex of the lung is overlooked (53, 63). Perforation of the pleura or the lung may occur in any deep laceration or stab wound of the neck; it may result from bullet wounds, from splinters of a fractured clavicle during brachial plexus or stellate ganglion block, or during surgical operations in the cervical region. The sudden pneumothorax may produce pulmonary collapse and tension pneumothorax. Closed drainage under water is the treatment of choice for this condition.

Nerves. Injuries to the nerves may consist of direct severance or concussional injury. Early exploration of neck wounds offers an opportunity for prompt surgical repair and restoration of nerve continuity. Important nerves to consider for surgical repair are the hypoglossal, spinal accessory, vagus, recurrent laryngeal, phrenic, and the brachial plexus. Injury to the phrenic nerve may not produce paralysis of a hemidiaphragm because of the presence of an accessory phrenic nerve in about 75 per cent of subjects (24). Whenever possible, however, the severed phrenic nerve should be sutured. Transection of the vagus nerve is important not only because of the resulting vocal cord paralysis, but also because of the changes in pulmonary function which occur. Klassen, Morton, and Curtis (42) have shown that cervical vagal section abolishes the cough reflex of the homolateral bronchial tree. This results in an inadequate expulsion of mucus. Concussional injury to nerves may take place without transection. This injury should be treated conservatively. Subsequent physical therapy is helpful and a good functional result may be expected.

In wounds of the posterior triangle of the neck, the continuity of the spinal accessory nerve should be tested. During exploration of the wound, the spinal accessory nerve should be exposed and sutured if transected. Subsequent regeneration of nerve fibers into the trapezius muscle will prevent deformity of the neck in most patients. Superficial branches of the cervical plexus are most prone to injury, but the resulting sensory defect is slight and usually may be diagnosed only by a careful neurologic examination. The brachial plexus, although situated more deeply, is not immune to serious injury which may result from a direct blow, a deep laceration, or a stab wound. An avulsion from a strong jerk or traction on the arm can disrupt the plexus.

In evaluating the clinical symptoms of a patient with complete or incomplete anatomic separation of the brachial plexus, Davis, Martin, and Perret (19) believe that the most accurate and practical method is to determine the extent of the paralysis by a detailed examination of the muscles and to locate the level of injury prior to surgical exploration by a knowledge of the innervation of these muscles. Rupture is most frequent in the fifth and sixth cervical nerves, which are subjected to the greatest stretch. Avulsion of the roots from the spinal cord is less frequent. When it occurs, spinal cord symptoms are usually present. The lower roots and the seventh and eight cervical and first thoracic spinal nerves which contribute to the plexus are less often injured and exhibit more evidence of spontaneous recovery. In stab or bullet wounds, however, the most exposed portions of the plexus are usually injured; they are the fifth, sixth, and seventh cervical nerves and the upper trunk of the brachial plexus in their course between the anterior and medial scalene muscles across the lateral side of the neck.

In axillary and infraclavicular wounds, the individual nerves which arise from the cords of the plexus and the larger blood vessels are more likely to be injured. Associated injuries, such as fractures, are frequent. As a rule, immediately after trauma to the brachial plexus, the entire extremity is paralyzed and anesthetic. Davis and his colleagues believe that the best possible results after a brachial plexus injury are obtained by delaying operation until the acute effects of the injury to the soft parts have subsided. Occasionally it may be possible for the surgeon to perform primary suture of the lacerated brachial plexus after debridement.

Thoracic duct. The thoracic duct, although rarely injured by cervical trauma, has been lacerated or torn during the course of intrathoracic sympathectomies or esophagectomies (5). It also may, of course, be injured by wounds and operations in the neck itself. The thoracic duct passes up behind the esophagus, the arch of the aorta, and the left subclavian vein between the left side of the esophagus and the left pleura to the thoracic inlet. Passing into the neck, the duct forms an arch which may rise to as much as 5.5 centimeters above the clavicle.

It then crosses anterior to the subclavian vein, the vertebral artery and vein, and the thyrocervical trunk or its branches and empties into the vascular system at the angle of junction of the left subclavian vein and the left internal jugular vein.

The right lymphatic duct is about 1.25 centimeters long, and normally ends in the right subclavian vein at its junction with the right internal jugular vein. This duct and its tributaries drain the right side of the head and neck, the right upper extremity, the right side of the thorax, right lung, right side of the heart, and part of the convex surface of the liver.

A lymphatic fistula may be a distressing complication of a cervical wound. When the thoracic duct has been injured it may be ligated without fear of complication in order to prevent or control a chylothorax or fistula.

SUMMARY

Soft tissue injury of the cervical region should receive greater attention from surgeons if decreased morbidity and mortality rates are to be attained. Knowledge of the neck as a conduit, the multitude of underlying structures, and the devious paths that penetrating missiles can take is essential for a satisfactory evaluation of injuries in the neck. The only certain method of determining the exact injury in wounds penetrating the platysma is early exploratory cervicotomy. A study of morbidity and mortality statistics demonstrates that early and thorough exploration reduces complications and saves lives.

The general principles of management of soft tissue injuries of the neck are not unique for this location. They consist of adequate airway control; surgical exploration, repair, and drainage; restoration of blood volume; antimicrobial therapy; and careful postoperative management.

Early tracheostomy, even under the most unfavorable circumstances, should be performed to relieve respiratory obstruction. Definitive surgical repair should be carried out only in an adequately staffed operating room with carefully controlled anesthesia and adequate blood available for replacement.

The most common complications of soft tissue injuries of the neck are respiratory obstruction, hemorrhage, infection, and pulmonary insufficiency. These complications may be minimized by the establishment of an airway, the restoration of normal respiratory function, early surgical exploration and repair, adequate wound debridement, and drainage when it is indicated.

Careful supervision of emergency services by experienced personnel and a continuing educational program emphasizing the principles of diagnosis and management of major traumatic wounds will save many patients with penetrating wounds of the neck.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EAR, NOSE, AND SINUSES

Stapedoplasty. ARTHUR L. JUERS. *Ann. Otol. Rhinol.*, 1960, 69: 316.

THE AUTHOR describes surgical techniques for operations on the stapes used in a number of cases in which an efficient conduction mechanism is constructed by stapedoplasty without the use of foreign materials. Anterior crurotomy is first carried out and if, during this procedure, the posterior portion of the footplate mobilizes, the footplate is divided by the Fowler technique, leaving its mobile posterior portion attached to the undisturbed posterior crus. Four such cases were encountered.

If, after anterior crurotomy, the posterior portion of the footplate remains ankylosed, a posterior crurotomy is carried out, leaving the crus as long as possible, and 1 of 2 procedures is used. First, a partial stapedectomy may be carried out, the opening being covered with a graft of perichondrium taken from the base of the helix, and the posterior crus being applied to the graft; or, secondly, if the posterior crus is long enough, it may be simply hung in the oval window and packed around with perichondrium graft. These 2 techniques were each used in 4 of the author's cases. In another 7 cases, after anterior and posterior crurotomy, the author made a small perforation in the footplate, covered it with perichondrium graft, and applied the posterior crus to the graft-covered perforation. The average results obtained in these 4 groups of cases 3 to 8 weeks after operation are presented, the 8 patients who had partial stapedectomy having the best and the 4 treated by the Fowler technique having the poorest average improvement in hearing.

The author comments that when severe postoperative high tone losses occur, these may be related to excessive manipulation of the footplate, the entry of topical anesthetic and blood into the vestibule after stapedectomy, and the inner ear's biologic response to the application of grafts or gelfoam.

—*John R. Lindsay, M.D.*

Tissue Reaction Following Reconstruction of the Oval Window in Experimental Animals. RICHARD J. BELLUCCI and DOROTHY WOLFF. *Ann. Otol. Rhinol.*, 1960, 69: 517.

A SERIES OF EXPERIMENTS is described and profusely illustrated with photomicrographs in which various aspects of stapes footplate operation, including the use of vein grafts and gelfoam in the oval window, have been examined in cats. In 9 cats vein grafts were applied to the oval window after complete or partial removal of the footplate. Animals in 5 of 6 such cases of complete stapedectomy with endothelium facing the middle ear showed severe inner ear fibrosis, even proceeding to the point of new bone formation, and in 3 of the 5 cases this was clearly an aseptic process. In 2 cases in which the stapes was only partially removed and vein grafts were used, no cochlear damage was noted; in 1 the endothelium of the graft faced the middle ear, and in the other it faced the inner ear. The authors conclude that footplate fragments served to protect the inner ears in these 2 cases. In all cases the vein graft stimulated extensive middle ear fibrosis, irrespective of whether the endothelium faced the inner ear or the middle ear.

In 8 cases gelfoam was placed in the oval window after complete or partial stapedectomy in 4 cases each. Fibrosis was generally less than in the cases with vein graft, but 3 of the animals with total stapedectomy in which gelfoam was used showed inner ear fibrosis. As in the vein graft cases, when the stapedectomy was incomplete inner ear fibrosis was less frequently seen. In 2 of these cases, gelfoam being used after total stapedectomy, the basilar membrane could no longer be identified and Deiters', Hensen's, and sulcus cells were missing from the basal coil. It is concluded that these observations may indicate the occurrence of chemical toxic damage.

—*John R. Lindsay, M.D.*

Facility in Tonsilloadenoidectomy Management. BEN T. WITHERS. *Arch. Otolar.*, Chic., 1960, 72: 183.

THE AUTHOR outlines his conclusions, based on 2,400 cases, concerning the most suitable method of conducting tonsilloadenoidectomy. Parents should receive written rather than oral instructions; no operation should be attempted unless the child has been free from acute infection for 10 to 14 days. Vitamins K, C, and B should be given preoperatively and postoperatively. Premedication should be left to the anesthetist. Every surgeon has his own preferred surgical technique and the author's only surgical note is to recommend the use of "figure-of-eight" sutures for hemostasis. Postoperatively, penicillin is given in the recovery room and on the following day; meperidine hydrochloride is given for pain and nembutal for sleep. The use of premarin seems to decrease the risk of immediate postoperative hemorrhage.

—*John R. Lindsay, M.D.*

MOUTH AND HYPOPHARYNX

The Role of Trauma in the Pathogenesis of Temporomandibular Joint Arthrosis. EKREM GOZUM. *Ann. Otol. Rhinol.*, 1960, 69: 348.

LITTLE INFORMATION is available concerning the cause and incidence of temporomandibular joint arthrosis, but trauma has been mentioned in this regard. The author discusses the anatomy, physiology, and pathology of this joint and presents the results of recent re-examinations of 45 patients who, between 1942 and 1956, had received treatment for fracture of the mandible. Brief histories are given of the 4 patients in whom demonstrable temperomandibular joint arthrosis developed. Five other patients in the series had pain around the joint, 3 had crepitation, and 4 complained of earache. Analysis of the results suggested that the incidence of arthrosis was high in cases of comminuted fractures of the ascending ramus and of the condyle associated with displacement.

—*John R. Lindsay, M.D.*

Interosseous Wiring of Mandibular Fractures. ANTHONY DITCHFIELD. *Brit. J. Plast. Surg.*, 1960, 13: 146.

THE EXPERIENCE of the members of the Plastic and Jaw Department of the United Sheffield Hospitals, Sheffield, England with internal fixation of mandibular fractures is presented. Of 86 patients treated in the previous 6 years, 50 have been traced. The fractures tended to be of the more complicated variety; 8 patients had double fractures. In spite of this the results of this method appear to be favorable. In all 50 patients who had follow-up studies a bony union was obtained. Pre-accident occlusion was restored in all patients. Only 4 patients had purulent drainage from the fracture site postoperatively. Only 2 required removal of the wire. —*John W. Braasch, M.D.*

An Oral Benign Lesion Progressing to Epidermoid Carcinoma with Metastasis to the Lung. JAMES F. SMITH. *Oral Surg.*, 1960, 13: 977.

A CASE is presented of epidermoid carcinoma of the buccal mucosa with extension to the floor of the mouth and metastasis to the neck. Repeated biopsies of an area in the mouth had been performed over a 6 year period before the carcinoma developed. The patient had used snuff for 25 years and held the snuff in the same position in the mouth. Repeated biopsies of this area showed the following progression: hyperkeratosis, hyperkeratosis with parakeratosis, verrucous hyperplasia, dyskeratosis with a malignant pattern, and, finally, frank epidermoid carcinoma. Eighteen months after mandibular resection with dissection of the left side of the neck, the lesion recurred locally in the mouth and metastatic epidermoid carcinoma of the lung was found. —*John W. Braasch, M.D.*

SALIVARY GLANDS

Surgical Management of Parotid Lesions. OLIVER H. BEAHRS, LEWIS B. WOOLNER, STEPHEN W. CARVETH, and KENNETH D. DEVINE. *Arch. Surg.*, 1960, 80: 890.

A STUDY was made of the records on a total of 760 surgically treated patients with parotid lesions seen at the Mayo Clinic from 1945 through 1954; 598, or 79 per cent, of the lesions were benign and 162, or 21 per cent, were malignant. The 10 year recurrence rate of mixed tumors treated by enucleation or excision was 10 per cent for primary lesions and 31 per cent for secondary (recurrent) lesions. None of the 47 patients treated by conservative parotidectomy for primary mixed tumors and observed for 3 to 5 years has had a single recurrence. Thirty-five per cent of the patients with moderately malignant lesions and 73 per cent of those with highly malignant lesions had recurrence in less than 3 years. The 5 year survival rate of patients with moderately malignant tumors varied from 76 to 92 per cent; for patients with highly malignant tumors, it ranged from 31 to 57 per cent.

Subtotal or total conservative parotidectomy is advocated for most benigh lesions of the parotid gland, while total radical parotidectomy usually is considered advisable for malignant lesions.

NECK

Carcinoma of the Thyroid. PETER W. HOAGLAND, ALEXANDER M. BOYSEN, ELBERT B. FOUNTAIN, WILLIAM W. NICHOL, and WARNER F. BOWERS. *Am. J. Surg.*, 1960, 99: 908.

THE NATURAL HISTORY of the differentiated forms of carcinoma of the thyroid is poorly understood; therefore, a rational approach to therapy must be based upon personal experience and the results obtained by others.

Approximately 4 per cent of all patients have a palpable nodule of the thyroid. Two to 4 per cent of the nodules harbor an unsuspected carcinoma. Since the prognosis for undifferentiated cancer of the thyroid is uniformly poor, treatment should be directed toward prevention of local infiltration.

Prophylactic radical neck dissection does not appear to be indicated. However, radical neck dissection is the present treatment of choice for proved cervical metastases.

Thyroxin or tri-iodothyronine may prove valuable in the treatment of differentiated carcinomas of the thyroid. —*Harold Laufman, M.D.*

SURGERY OF THE NERVOUS SYSTEM

CEREBRUM, CEREBELLUM, AND HYPOTHALAMUS

The Roentgen Diagnosis of Intracranial Incisural Space Occupying Lesions. JUAN M. TAVERAS. *Am. J. Roentg.*, 1960, 84: 52.

THE AUTHOR presents a roentgenologic study of 24 patients with tumors in the region of the incisura of the tentorium. The 24 patients consisted of 16 with meningiomas, 5 with aneurysms, and 3 with chordomas. Intrinsic cerebral lesions were purposely not included. The need for accurate roentgenologic diagnosis is obvious in any potential surgical intervention in this area.

Pneumoencephalography or ventriculography most frequently gave the diagnosis; however, at times arteriography was not only of help but also mandatory to verify the diagnosis. Obviously, this was primarily true in the vascular lesions, but arteriography was also of great help in the midline anterior lesions.

In most of the cases, the posteroinferior portion of the third ventricle presented a fairly characteristic indentation as seen in the frontal posteroanterior projection. In the anterior midline lesions, a pneumoencephalogram may help in differentiating an extra-axial from an intra-axial lesion by demonstrating the presence of air about the tumor. Vertebral angiography may help by showing the basilar artery displaced posteriorly by an extra-axial mass or anteriorly by an intrinsic lesion. It is pointed out that frequently there is atrophy secondary to the presence of tumors and hence there might easily be air in the cisterna pontis or cisterna interpeduncularis. Tumors situated anterolaterally may more frequently be diagnosed by means of the presence of a combined deformity of the inferolateral aspect of the third ventricle and the temporal horn. The posterior midline and posterolateral lesions are the most difficult to differentiate. Both carotid and vertebral angiography may be necessary since a cerebellar lesion with upward herniation might well mimic an extrinsic lesion in this location. A meningioma arising from the tentorial edge will frequently displace the vein of Galen and the posterior part of the internal cerebral vein downward and forward. —*Jack I. Woolf, M.D.*

Reduction of Intracranial Pressure with Hypertonic Urea. JOHN STUBBS and JOE PENNYBACKER. *Lancet*, Lond., 1960, 1: 1094.

IN 129 NEUROSURGICAL PATIENTS urea was administered intravenously, after the method of Javid, to reduce the intracranial pressure. The main effect was a decrease in brain bulk, which made operation easier and safer. Although arterial oozing was often increased in the early stages of operation, this was believed to be more of a nuisance than a danger. The fall in intracranial pressure was measurable at the time of lumbar puncture.

No major toxic effects were noted. Local reactions were observed in the vein used, but they never progressed to thrombosis. The blood urea level rose and diuresis began shortly after the infusion was started; hence the authors state that urea should not be given to patients with impaired renal function.

Apart from its use during brain operations urea was employed (1) to tide over a comatose patient until he could be transported to a neurosurgical center; (2) to treat "the second day slump"; (3) to treat patients with acute head injury or tuberculous meningitis whose intracranial pressure was high; and (4) to relieve benign intracranial hypertension.

The authors postulate that the most likely mechanism of the reduction of intracranial pressure is a blood-brain barrier to the urea.

—*Joseph Ransohoff, M.D.*

The "Third Day Crisis" in Surgery of the Brain (La "crise du troisieme jour" en chirurgie du cerveau). G. LAZORTHES and L. CAMPAN. *Acta neurochir.*, Wien, 1960, 7: 94.

THE AUTHORS describe the clinical and pathologic aspects of the third day after intracranial operations. Clinically, the crisis consists of an increase of temperature, pulse, respiration, and sometimes blood pressure, associated with a depression of the level of consciousness. Neurologic signs appear or become more marked. A postoperative hematoma or cerebrospinal fluid block is usually suspected. The "third day crisis" seems to be caused by cerebral edema associated with hypertonic intracellular fluid and hypotonic extracellular fluid. The postoperative water, potassium, and sodium shifts appear to be parallel to those occurring in general surgical operations. The authors believe that there is a tendency for intracranial hydration to follow hydration of the body as a whole, but that there are frequent exceptions. Intracranial hypotenson is an occasional surgically verified cause of the "third day crisis." —*George L. Potter, M.D.*

The Surgical Treatment of Spontaneous Cerebrospinal Rhinorrhea. CHARLES E. TROLAND. *Arch. Otolar.*, Chic., 1960, 72: 254.

IT HAS BEEN POSTULATED that spontaneous cerebrospinal rhinorrhea, occurring in the absence of trauma, infection, tumor, raised intracranial pressure, or demonstrable congenital defect, is due to the escape of fluid along the olfactory fibers. The author discusses this postulate and presents a case in which the condition was arrested by clipping the olfactory bulb, pulling the filaments of the nerve from their foramina, and plugging the points of exit with muscle.

—*John R. Lindsay, M.D.*

Effect of Cutting the Tentorium Cerebelli on the Response to Craniocerebral Trauma. ROGER M. MORRELL. *J. Neurosurg.*, 1960, 17: 374.

TWENTY-SIX young adult dogs were subjected to midline occipital craniotomies under intravenous nembutal anesthesia. In 13 animals the tentorium was completely divided from the skull before the bone flap

was replaced. Three to 4 weeks later, under nembutal anesthesia, a measured blow of 18.12 kgm./cm.^{2} was given to the dog's head with a 5 pound weight by means of a solenoid apparatus. At 6 weeks all animals surviving were sacrificed. Four of the dogs with intact tentoriums lived the 6 weeks. Eight with severed tentoriums survived the same period. Four of those with intact tentoriums succumbed the day of the trauma, while only 1 with the tentorium cut died that day

Nine of the 13 controls were listed as having uncal herniations or cerebellar pressure cones, but only 4 of the treated group were so listed. Hydrocephalus existed in 2 and minimal ventricular dilation in 1 of the controls, but this was found in none of the animals with previously sectioned tentoriums.

—*George L. Potter, M.D.*

The Heroic Treatment of Acute Head Injuries. A. Earl Walker and Perry Black. *Am. Surgeon*, 1960, 26: 184.

The effect of tracheostomy, hypothermia, and lobectomy upon the course of patients with severe head injuries was scrutinized by the authors. The patients of the series were admitted to the Neurosurgical Service of the Johns Hopkins Hospital in Baltimore, Maryland and consisted in less than 10 per cent of the total patients with head injuries seen in the emergency room of that institution. The survey included all patients admitted in the last 5 years who required the aforementioned procedures or who succumbed to their injuries. The surviving patients, with 1 exception, have been interviewed and examined from 6 months to 5 years after their injury.

Surgical procedures on the head were usually carried out under general anesthesia and as soon as the patient's condition warranted, ordinarily within 2 to 6 hours after injury. Tracheostomy was performed under local anesthesia in the conventional manner. The degree and duration of hypothermia varied considerably. Cooling was induced by a blanket through which water flowed at a given temperature. Cooling to 90 degrees F. could be achieved within 0.5 to 2 hours. Hypothermia was usually induced after the patient's return from the operating room; occasionally, it was induced before operation. Temperatures were recorded every 30 minutes by rectal thermocouple and the duration of hypothermia varied from an hour to 8 days, with an average of 4 days. The temperature varied several degrees in each case, but the lowest reading was 86 degrees F.

Lobectomy was performed when localized laceration with pulping of nerve tissue was noted. In several cases this consisted of frontal or temporal lobectomy. In a few cases with marked cerebral edema the tip of the right temporal lobe was removed. In addition, the medial temporal structures were excised and herniation of the uncus was relieved when present.

The death rate was more than 50 per cent. Age was an important factor. The patients who survived tracheostomy were 20 years younger on the average than those who died. The mortality for individuals who were more than 40 years of age was 70 per cent whereas for the patients less than 40 it was half that.

Half of the surviving patients were severely handicapped. Of the 9 adults without residual neurologic disability, 4 were unable to work because of their mental state. Three of those without disability had sustained depressed skull fractures and 2 of these might have fared as well without heroic measures. Nine of 66 patients treated by these heroic measures were salvaged for relatively normal lives. Fifteen patients had such serious neurologic deficits that they were unable to carry out self care.

The authors were fortunate in having access to the specimens of the Medical Examiner of the City of Baltimore, Maryland. In some of the cases hypothermia had been used. The specimens were assessed without access to knowledge of the patient's history and course prior to death. When the results were analyzed, no significant difference was seen in the findings with regard to contusions and edema in the total case group. However, the time, duration, and degree of cooling varied considerably and the authors believe that if a group of patients were treated by hypothermia immediately after injury and the temperature maintained at 30 degrees C. for 3 to 5 days, the results might more nearly approximate the findings in experimental animals. They also state, however, that such an ideal situation does not present itself in clinical practice.

The authors conclude that heroic treatment is not the solution for the problems of head injury.

—*Edward B. Schlesinger, M.D.*

Subdural Hematoma. Wylie McKissock, Alan Richardson, and William H. Bloom. *Lancet*, Lond., 1960, 1: 1365.

The authors reviewed 389 cases of subdural hematomas seen between 1940 and 1958. Forty-four deaths resulted from 82 acute hematomas and 18 deaths from 91 subacute hematomas. Of 216 patients with chronic hematomas, 13 died. In acute and subacute hematomas the incidence increased steadily with age. Mortality increased with age in all 3 groups. The over-all mortality was 75, 19.3 per cent.

Alteration in the level of consciousness occurred in most of the patients with the acute and subacute forms and in one-half of the patients with the chronic form. Most of the latter had headache. Confusion, paresis, and vomiting were less frequent symptoms of the subacute and chronic forms. When the pupils were unequal, the dilated pupil was on the same side as the lesion in 79 per cent. When paresis was present, it was contralateral in 59 per cent. Dysphasia was always associated with a lesion of the dominant hemisphere.

Skull fracture was not associated with increased mortality. The level of consciousness on admission was classified as alert, drowsy, stuporous, or comatose. Mortality was proportional to the impairment of consciousness. Rapid evolution of symptoms also indicated a poorer prognosis. Thus, a comatose patient with a chronic hematoma, a subacute stuporous patient, and a drowsy patient with the acute form had a mortality of about 25 per cent.

Patients with acute and subacute forms were treated by bilateral burr holes with ventriculography if the lesion was not evident. At autopsy some hematomas were noted to be inadequately aspirated. In some other fatal cases, associated, unsuspected hematomas

were found. Of 216 patients with chronic hematomas, 184 were treated by burr holes alone, the remainder requiring ventriculography and/or craniotomy. The greatest complication of operation was failure of the patient to improve because of cerebral edema, brain stem hemorrhage, intracranial hypotension, or intracerebral hematoma. —*George L. Potter, M.D.*

Metastatic Tumors of the Brain. MIRCEA D. SIMIONESCU. *J. Neurosurg.*, 1960, 17: 361.

CEREBRAL METASTASES were seen among 195 of 2,901 patients (6.7 per cent) with expanding intracranial lesions admitted to the Neurosurgical Clinic, Bucharest, Rumania between 1935 and 1958. Metastatic disease occurred between the ages of 40 and 60 in 145 cases. Males predominated, 61.7 per cent. The primary lesion was pulmonary in 75 cases, in the breast in 44, in the kidney in 16, a skin tumor in 12, and in other known sites in 25. The primary site was not determined in 23. Fifty per cent of the metastases were in the frontal lobe.

Of 75 lung tumors, the primary site was detected prior to admission in 14, on admission in 48, and at autopsy in 13. Of 32 primary breast tumors surgically removed, evidence of cerebral metastases developed in 9 patients in 3 to 12 months and in 23 in more than 2 years. The earliest symptom was usually headache. In 35 cases the initial sign was psychic disorder; in 46, high intracranial pressure; in 49, seizures; in 30, motor weakness; and in 24, speech disorders. Seizures occurred in 56 patients. Twenty-one had unilateral jacksonian seizures; 18 had jacksonian seizures followed by unconsciousness; 8 had continuous jacksonian seizures; and 9 had grand mal subintrant convulsions. The latter two occurrences were considered typical of multiple metastases. In 125 cases patients showed an acute form which could have been confused with cerebral infarction.

All patients not operated upon succumbed within 6 months. Of the 172 patients operated upon, 66 died in the first 3 weeks. Eighty-nine survived about 6 months. One patient with bronchogenic carcinoma survived 6.5 years. —*George L. Potter, M.D.*

Primary Tumors of the Cerebellum (Sui tumori primitivi del cervelletto). F. GULLOTTA and G. SPIGOLON. *Arch. ital. pat. Clin. Tumori*, 1960, 4: 3.

THE MATERIAL studied consisted of 32 medulloblastomas, 29.1 per cent; 49 spongioblastomas, 44.5 per cent; 23 angioreticulomas (Lindau's disease), 20.9 per cent; 3 ependymomas, 2.7 per cent; and 3 sarcomas, 2.7 per cent. A few extremely rare neoplasms including oligodendromas, gangliocytomas, and epidermoid and dermoid cysts are also discussed briefly. The patients with medulloblastoma ranged in age from a few days to 30 years, those with spongioblastoma, from a few days to 45 years; and those with angioreticuloma, from 19 to 60 years. There were no notable variations in the sex incidence.

Undoubtedly, the principal elements to be used as diagnostic guides with reference to operative indications are the duration of the symptoms and the age of the patient. It is true that cerebellar tumors tend to produce clearly evident signs of increased intracranial pressure early; however, the differences are not sufficiently remarkable to afford a definitive judgment as to the location of the neoplasm within the general cavity of the cranium. The rarer cerebellar tumors are, of course, distinguished to a certain extent by their very rarity. The most frequently encountered types, the spongioblastomas and medulloblastomas, usually occur in very young patients; whereas, the other types of cerebellar tumors and intracranial tumors at other locations are usually found in adults. Analogous considerations may be adduced for the matter of location; the most frequent tumors of extreme youth, medulloblastomas and spongioblastomas, are usually central in location, while in the older patients the location of the tumor within the cerebellum is predominately lateral. Finally, with reference to the duration of symptoms, it is observed that in the cases of medulloblastoma the history of the disease does not in general exceed 12 months, while with the spongioblastoma it may extend back for a period of as much as 5 years. With these considerations may be correlated the specific, and occasionally pathognomonic, symptoms of the vermis cerebelli (medulloblastoma), the hemispheres (astrocytoma), and the fourth ventricle (ependymoma). One may not depend too much on the subsidiary diagnostic procedures such as electroencephalography and angiography. Roentgenography may aid by disclosing a defect of the foramen magnum, and eye ground examinations may give evidence of the presence of Lindau-von Hippel disease.

Surgical intervention should always be followed by irradiation therapy. —*John W. Brennan, M.D.*

The Width (Third Dimension) of the Sella Turcica. GIOVANNI DI CHIRO. *Am. J. Roentg.*, 1960, 84: 26.

THE SELLA TURCICA, as any other anatomic structure, should always be studied three-dimensionally. The lateral roentgenographic view of the skull yields the length and the height of the sella turcica. The width of the sella turcica may be obtained from the contour of the sellar floor, recognizable in more than 90 per cent of the cases on the standard posteroanterior roentgenogram of the skull. This is done by identifying the coronal outline of the sellar floor which appears as a plateau. The landmarks to measure the width of the sellar floor are the highest points of the lateral edges of this plateau, which in most instances is rather flat or concave, rarely convex.

The author gives some of the advantages connected with three-dimensional appraisals of the sella. Sellas considered enlarged on the lateral roentgenogram may prove to be only long and narrow but within normal limits. On the other hand, sellas considered normal may be abnormally wide and, therefore, pathologic. Not only does the length and height of the sella correspond to the length and height of the pituitary gland but also the width of the sella corresponds to the width of the pituitary gland. With the three diameters of the sella available, it is possible to calculate the volume of the sella and, with some limitation, the volume of the pituitary gland. The limitations are that occasionally the dura surrounding the pituitary gland may represent as much as 25 per cent of the total weight of the intrasellar content and that pockets of subarachnoid space containing fluid may be within the sellar cavity. On the other hand, part of the

pituitary gland is above the diaphragm and outside the sella. Such calculations have been carried out and verified with anatomic specimens in 10 cases.

Although the pituitary gland increases in size during pregnancy, the sella turcica does not. Therefore, a roentgenographic determination of the volume of the pituitary gland in vivo is feasible with certain limitations. A volumetric appraisal of the size of the sella is more accurate than the linear and area methods used up to now. The percentile weight of the different components of the pituitary gland is as follows: 70 per cent anterior part, 18 per cent posterior part, 2 per cent intermediate part, 5 per cent stalk, and 5 per cent capsule. —*Morris Sanders, M.D.*

Surgical Application of the High Intensity Focused Ultrasound—I, Outline of Selective Focal Destruction of the Central Nervous System. M. Oka, T. Okumura, H. Yokoi, T. Murao, and Others. *Med. J. Osaka Univ.*, 1960, 10: 427.

The production by ultrasonic methods of small focal lesions in the cat is reported. The boundaries of the lesions were sharp. There did not appear to be any bleeding associated with the lesions.

The literature is briefly reviewed and the cases of 2 patients are presented in detail. One of these had an ultrasonic prefrontal lobotomy, and in the other the left frontal lobe and anterior portion of the thalamus was destroyed. Both patients in this reported study were improved.

Four other cerebral procedures were performed by the authors, and 3 breast tumors were treated, with encouraging results. —*Sanford Larson, M.D.*

Pituitary Tumors in the Dunedin Neurosurgical Unit. P. H. G. MacCallum. *N. Zealand M. J.*, 1960, 59: 146.

A review is made of 47 cases of pituitary tumor observed at a neurosurgical unit in Dunedin, New Zealand since its inception some 15 years ago. The main points of interest were as follows:

The majority of the tumors were chromophobic adenomas. Two were eosinophilic tumors. There were no basophilic tumors in the series. Diagnosis was never made without the appearance of signs of optic disorder.

The operative mortality has been low: only 2 patients died and these were bad risk patients. The operation was always an intracapsular removal of the tumor.

Improvement in the visual field after operation was the normal occurrence and good results the rule, the exceptions being 5 cases in which the optic nerves were irreparably damaged by massive or long standing tumors.

Endocrine disorders were in the main adequately controlled with a combination of cortisone, thyroxine, and testosterone (in the males).

The degree and speed of recovery did not seem to be influenced by the use of postoperative deep roentgenotherapy, but there does seem to have been a definite reduction in the recurrence rate although the author believes that more time may be necessary to establish this point more firmly.

—*Joseph Ransohoff, M.D.*

The Analgesic Action of Hypophysectomy on Metastatic Cancers (A propos de l'action analgésique de l'hypophysectomie vis-à-vis des cancers metastatiques). P. Juret. *Presse méd.*, 1960, 68: 1044.

Sixty-nine women with breast cancer and 3 men with prostatic cancer at the Institute Gustave-Roussy, Villejuif, France, were transferred to the Hôpital Ste. Anne for a few days and operated upon by Dr. Talairach. Intrapituitary implantations of radioactive gold (Au^{198}) in 30 patients and of yttrium (Y^{90}) in 42 patients were made transnasally. Only 1 of the radioactive gold implantations resulted in endocrine evidence of hypophysectomy, but pain was markedly relieved in 11 patients. The implantation of yttrium resulted in hormonal changes in 13 patients and relief of pain in 21.

The author discusses the possible explanations for the analgesic effect without objective evidence of improvement and notes that the transnasal approach eliminates the possibility of any interruption of frontothalamic fibers. He suggests that since diabetes insipidus may occur after hypophysectomy, retrograde degeneration along the supraopticohypophysial tract may affect hypothalamic nuclei. The nuclei, in turn, may influence pain pathways in the thalamus. Another possible mechanism is interruption of sympathetic fibers in the sella turcica or in the nasal submucous plexus. —*George L. Potter, M.D.*

Hypophysial Implantation of Radioactive Gold in the Treatment of Cancer of the Breast (Implantación hipofisaria de oro radiactivo en cáncer de mama). Samuel S. Penington. *Sem. méd.*, B. Air., 1960, 67: 1045.

The author implanted from 25 to 120 mc. of radioactive gold into the neurohypophyses of each of 62 patients, including 53 with breast cancer. A transnasosphenoidal approach was used. All cases were considered preterminal. One patient died of pneumococcal meningitis. Postoperative diplopia developed in 3 patients. Nine had transient polyuria. Five patients were controlled for 25 months. The author considers this procedure effective, and relatively more suitable in poor risk patients than is the conventional type of hypophysectomy.

—*George L. Potter, M.D.*

SPINAL CORD

Developmental Posterior Enteric Remnants and Spinal Malformations. J. F. R. Bentley and J. R. Smith. *Arch. Dis. Childh.*, Lond., 1960, 35: 76.

The authors emphasize the etiologic factors that unite a wide variety of developmental anomalies of the skin of the back, the spine, the central nervous system, and the gut. An embryo may develop with partial duplication and separation of the notochord, the site and extent of the separation being variable. A gap develops in the dorsal tissue mass between the two parts of the notochord through which the ventrally situated yolk sac or gut anlage endoderm will herniate. The hernia may rupture to produce a fistula from the yolk sac into the amniotic cavity separating the halves of the future cord and spine. Subsequent differential growth of the embryo tends to close and ob-

literate the fistula and the extent of the residual lesions depends on the success of this process.

All the consequent malformations fall into two classes: (a) visceral malformations and (b) spinal and central nervous system malformations. The malformations include: spina bifida, "butterfly vertebra," diastematomyelia, diplomyelia, Klippel-Feil syndrome, intestinal fistula, spinal and cranial cysts, dermoid cysts and sinuses, enteric duplications or diverticula, intestinal malrotations, and diaphragmatic hernias.

The mode of development of these anomalies is described and outlined by means of diagrams in the text. Clinical reports of 5 cases demonstrating various manifestations of the split notochord syndrome are appended and illustrated with photographs and roentgenograms. A concise discussion of the embryologic background of the problem and the various theoretical considerations in the literature is utilized by the authors to emphasize their reconciliation of the embryologic facts with the clinical findings. They believe that a wide variety of malformations can be classified together as manifestations of the split notochord syndrome. They offer a terminology for the abnormal structures of enteric origin in the group and also point out that the apparent rarity of some members of the syndrome is not true, but merely due to failure to appreciate the common basic cause of the various representatives of the group.

—Edward B. Schlesinger, M.D.

Alcoholic Subarachnoid Neurolysis (Neurolisi alcoolica sub-aracnoidea). G. BOARO and G. MARTINI. *Boll. Soc. piemont. chir.*, Torino, 1960, 30: 175.

FOUR PATIENTS 3 males and 1 female, with spastic paraplegia which had been present for at least a year were subjected to alcoholic subarachnoid neurolysis by a modification of the method of Bradford (1959). Bradford had noted that patients with a low block of the medullary canal responded better to treatment than did those with a high block or without block; he therefore attempted to produce a low block by placing the patient in the Trendelenburg position and injecting air preliminarily. This air would fill the caudal end of the spinal canal, and the subsequently injected alcohol would float up on the cephalad column of cerebrospinal fluid into contact with the air. Thus the alcohol would act in undiluted form on the nerve roots at the level chosen.

The author has modified Bradford's technique in nonessential details, such as the use of 2 spinal puncture needles, 1 for the air, the other for the alcohol, and injection of the alcohol in such manner as affords a bilateral neurolysis with only 1 injection. Five minutes after the injection, 5 c.c. of the alcohol-spinal fluid mixture is withdrawn together with as much as possible of the previously injected air. The author induces classical spinal anesthesia in the patient later to be treated by neurolysis, 1 or 2 hours before the projected treatment, so as to judge the probable permanent effect.

In 2, the female and 1 male, automatic bladder function developed; in the other 2 a hypertonic bladder was present. In 3 of these patients automatic bowel function also developed.

After the injection there always occurred an almost complete relaxation of the spastic limbs. In no instance was there any marked reaction of the patients to the injections; all complaints on their part subsided after 24 to 48 hours. Subfebrile temperatures were observed in all instances and were ascribed to absorption of some of the alcohol which remained. These reactions always regressed spontaneously within 36 hours. These patients were uniformly relieved by the treatment from all previously abnormal sensation and pains.

In the 2 patients with automatic bladders the subsequent bladder function was not disturbed; in the 2 patients with hypertonic bladder the permanent catheter could subsequently be eliminated, since they soon developed the power of voluntary micturition. The bowel function was on the whole not affected. Any bed sores healed rapidly, so that the patients could be transferred to special paraplegic beds of the Stryker type.

The posttreatment observation period of these patients has now lasted from a minimum of 80 to a maximum of 150 days.

The authors consider that this method of treatment of spastic paraplegia offers advantages which place it ahead of all other forms of treatment that one usually employed in this condition.

—John W. Brennan, M.D.

PERIPHERAL NERVES

Relief of Pain and Paresthesias by Nerve Block Distal to a Lesion. R. F. KIBLER and P. W. NATHAN. *J. Neurol. Neurosurg. Psychiat.*, Lond., 1960, 23: 91.

THIS REPORT presents 8 patients who had pain and paresthesias associated with lesions in peripheral nerves, nerve roots, root entry zone, posterior columns, and spinothalamic tract which were prevented by blocking the nerves distal to the lesion. The method used was local anesthetic injections of the afferent pathway distal to the site of the lesion. The effect of the injection far outlasted the duration of the anesthesia. Also, blocking a peripheral nerve supplying a large part but not the whole of the region where the pain or paresthesia was felt removed these sensations from the entire region. The authors believe that the spontaneous sensations experienced from a lesion in these areas are due to the impulses arriving from the periphery, which are somehow altered by the lesion. They briefly enter into the discussion as to the possible pathologic lesion of the nerves which gives rise to an artificial synapse, which would account for the pain of causalgia. Apparently, where a nerve is either interrupted physiologically or anatomically, a transmission from one bundle of nerve fibers to the other takes place at this site. When impulses are blocked from reaching the site of the lesion, impulses cannot be switched to these fibers whose central terminations end in parts of the brain where pain and paresthesias are experienced. However, the authors state that this mechanism cannot account for all the phenomena reported here. They raise several questions as to why the blocking of a nervous conduction from a part of a territory in which the pain or paresthesias are arising is sufficient to stop the pain and paresthesias through-

out the entire region, and also, why the actual sensibility of the skin of this area becomes more normal. They again suggest the possibility that the local anesthetic solution tracked up the peripheral nerves to the site of the lesion in the nerve root or in the spinal cord. The authors believe that this is a possibility but not a probability. They also bring up the possibility that the blocking impulses at a peripheral level have definite effects on events in the central nervous system, presumably at a spinal level. However, as shown in the treatment of postherpetic neuralgia, a posterior rhizotomy is notoriously unsuccessful, and this cutting of the roots might be thought of as being comparable to anesthetizing the peripheral pathway, as was done in the experiments that are reported here.

—*Morris Sanders, M.D.*

SYMPATHETIC NERVES

The Place of Lumbar Sympathectomy in Arteritis Obliterans of the Lower Limbs (La position actuelle de la chirurgie du sympathique dans les artérites obliterantes des membres inférieurs). I. FAGARASANU. *Bull. Soc. internat. chir.*, 1960, 19: 186.

THE AUTHOR affirms that lumbar sympathectomy alone gives a better long range result in arterial occlusive disease than the direct methods of endarterectomy, homografts, and prostheses. The latter methods are necessary in localized occlusions of the larger arteries, but should be preceded by sympathectomy. The author's 287 sympathectomies yielded good results in 51 per cent, slight improvement in 15 per cent, and failure in 34 per cent. He prefers the transperitoneal approach in order not to endanger pre-existing collaterals. Anomalies of the lumbar sympathetic trunk often cause poor results. —*George L. Potter, M.D.*

MENINGES

The Course of Purulent Meningitis (L'évolution des méningites suppurées). P. MOZZICONACCI and F. GIRARD. *Ann. ped.*, Par., 1960, 36: 275.

AN ANALYSIS is presented, mainly in tabular form, of the clinical course and bacteriologic findings in 227 cases of childhood meningitis observed in three French hospitals from 1946 to 1957.

One hundred and twenty-five patients were cured rapidly (within 15 days), and 24 died rapidly. Of the 77 patients with a prolonged course, 19 died. One patient was not traced. During the last 7 years of the study, a greater proportion of the patients was rapidly cured and fewer of them died. Patients in whom bacteria persisted in the cerebrospinal fluid longer than 5 days usually had sequelae. Rapidly fatal cases most often occurred with Diplococcus pneumoniae or Escherichia coli. The course was prolonged in 9 of 18 Hemophilus influenzae infections, in 15 of 37 pneumococcal infections, and in only 27 of the 93 cases of meningococcal meningitis. Eight of the 11 patients who had Escherichia coli infections died, but only 5 of the 90 with meningococcal meningitis died. Loculation was diagnosed in 16 patients, brain edema in 8, decreased intracranial pressure in 22, and subdural effusion in 14. Hydrocephalus developed in 11 patients, the oldest of these being 19 months. Twenty-seven patients had sequelae. There has been no significant change in the incidence of sequelae since 1950.

—*George L. Potter, M.D.*

SURGERY OF THE INTEGUMENT AND CONNECTIVE TISSUES

SKIN AND SOFT TISSUES

The Transfer of Free Composite Grafts of Skin and Fat. THOMAS D. REES. *Plastic & Reconstr. Surg.*, 1960, 25: 556.

THE AUTHOR reports a clinical investigation of 16 free composite grafts of skin and fat. There were 10 "takes," 3 partial failures, and 3 complete failures. Successful transfer of these relatively massive free grafts suggests that they are actively vascularized within a short time, possibly a few hours, after transplantation. Clinical and experimental evidence is accumulating which suggests rapid hemic vascularization, not only of composite grafts but also of split and whole thickness skin grafts. The most plausible mechanism by which a free graft could be vascularized within a few hours after transfer is that of direct vessel to vessel anastomosis between the graft and the recipient bed vessels.

Four forearm grafts were studied at 24 hour intervals with a stereomicroscope. This instrument permitted observation of intravascular flow of erythrocytes. Three successful forearm grafts showed some filling of vessels by erythrocytes within 24 hours and a definite flow was observed. By 48 hours considerable congestion of erythrocytes was noticed which proceeded to sluggish flow by the fourth postoperative day. In 1 case there was active flow on the fifth postoperative day, progressing to very active flow and clearing of the erythrocyte congestion with normal circulation by the tenth postoperative day.

It is concluded that free grafts of skin and fat apparently cannot develop vascular anastomoses from their under surface owing to the presence of subcutaneous fat; likewise the exchange of nutrient lymph or extracellular fluid is at best limited, again owing to the fat barrier. Perhaps the most significant factor in the success or failure of a composite graft is in the absolute atraumatic handling of the graft and the recipient wound.

It is not proposed that free grafts of skin and attached fat are clinically acceptable at this time. Further basic experimental studies must be carried out to clarify our knowledge of the circulation in composite grafts. —*Frank W. Pirruccello, M.D.*

Gangrenous Skin Lesions Associated with Chronic Ulcerative Colitis. MOSHE B. GOLDGRABER and JOSEPH B. KIRSNER. *Gastroenterology*, 1960, 39: 94.

THE AUTHORS review the differential diagnosis of skin gangrene and present a patient who was observed at the University of Chicago in Chicago, Illinois because of large areas of gangrene noted on the skin in association with ulcerative colitis.

The differential diagnosis of skin gangrene would include:

1. Cutaneous gangrene due to infection. At least one type has been associated with the name of Meleney. The organism involved has not always been clear.
2. Skin gangrene due to immunologic phenomena. The Shwartzman's phenomenon is probably of etiologic significance in this group. Also of interest is the reciprocal interaction of Shwartzman's phenomenon with certain types of infection.
3. Gangrene due to purpura fulminans. This rather unusual condition occurs mainly in children and usually combines the features of infection with those of tissue reactivity not unlike the Shwartzman's phenomenon. It is seen mainly in conjunction with meningococcemia although cases have developed after scarlet fever, measles, and other infections.
4. Gangrene due to thrombotic thrombocytopenia purpura. This syndrome occurring mainly in young women and characterized by anemia, thrombocytopenia, and neurologic manifestations may be accompanied by extensive hemorrhagic lesions with gangrene of the skin and subcutaneous tissue.
5. Gangrene due to pyoderma gangrenosum. This is most often associated with chronic ulcerative colitis and probably best explains the case in question. The condition is characterized by gangrene of large areas of skin with no tendency to heal and often with no correlation with the degree of severity of the colonic disease.
6. Gangrene due to arterial occlusion.
7. Gangrene due to less frequent causes. This would include panniculitis with hemorrhagic necrosis, mucocutaneous-ocular manifestations associated with certain types of bowel disease, and extensive skin gangrene as a complication of dicumarol therapy.

—*Harvey N. Lippman, M.D.*

Critical Appraisal of Results of Therapy for Malignant Melanoma (Zur Beurteilung der Behandlungsergebnisse bei malignen Melanomen). A. PRIESCHING and H. WASL. *Chirurg.*, 1960, 31: 257.

THE EXTREME POINTS of view which exist in the controversy regarding surgical versus roentgen therapy for malignant melanoma would probably not have arisen if comparable, adequately evaluated series of treated patients were available. The published series of malignant melanomas, including the larger ones, provide a basis for general conclusions, but cannot be evaluated in sufficient detail to permit intelligent decision regarding treatment of a particular melanoma in a definite location on an individual patient.

When the published series of patients are broken down to account for all of the numerous factors that influence prognosis in malignant melanoma, the splintered groups are so small that comparison is not valid. Diagnosis is the first variable to be considered. Clinical diagnosis is accurate in only half of the lesions which, on inspection, appear to be malignant melanomas. Patients who are treated by irradiation often have no histologic diagnosis, and 5 year survivals in such series must be adjusted to compensate for diagnostic error. Details of therapy, including the performance of incisional or excisional biopsy, must be comparable if results are to be compared. The stage of the disease—whether lymph nodes are only thought

to be free of tumor or whether they are shown histologically to be free of tumor, the presence of satellite tumors, and the presence of distant metastases—must be considered before therapy can be compared. The location of the tumor may have more to do with prognosis than does the type of therapy. The age and sex of the patient must be considered.

It is unlikely that any single institution can collect a volume of material large enough to satisfy the requirements which have been outlined. The authors suggest that central registries be established to collect information regarding patients with malignant melanomas. Standardized forms should be used to record pertinent information. These facts, together with those obtained in follow-ups, should be transferred to punch-cards, which could be made available to investigators for detailed analysis.

—Elmer V. Dahl, M.D.

PLASTIC REPAIR

The Anatomic and Physiologic Acclimatization of Tissue Transplanted by the Lip Switch Technique. JAMES W. SMITH. *Plastic & Reconstr. Surg.*, 1960, 26: 40.

THIS ARTICLE reports on a study of 15 cases in which Abbe or Estlander flaps were used in surgical reconstruction of the lips. These flaps have been studied extensively to determine the ultimate functional role they play in their new site.

Examinations were made on the regeneration of sensory, sympathetic, and motor nerves. It has been conclusively demonstrated that complete return of sweating and of sensitivity to pain, touch, and temperature occurs within 2 years. Electromyography has shown muscle function to be re-established in 1 year. Biopsy demonstrates normal appearing muscle to be present in the transplanted tissue.

The lip switch flaps have 2 unique advantages. The donor site components correspond so closely to the recipient site requirements that an excellent cosmetic result is achieved. The complete reinnervation of the transplanted tissue re-establishes it as an integral and functioning part of the oral musculature.

—Henry S. Patton, M.D.

Determination of the Viability of Pedicled Tubular Skin Grafts (Moyens paracliniques d'étude de la vitalité des lambeaux tubulés). P. FRANCHEBOIS and H. POURQUIER. *Ann. chir. plast.*, Par., 1960, 5: 85.

DETERMINATION of the viability of tubular skin grafts is primarily a problem of determination of the development of vascular supply. Three anatomic components should be taken into consideration, namely, the arterial, venous, and lymphatic vessels. The viability of pedicled grafts was evaluated experimentally with pigments such as fluorescein, with radiopaque materials, and with radioactive substances. Clinically, techniques such as oscillography, sphygmomanometry, and capillaroscopy were utilized. Other techniques used included angiography, registration of temperatures, and histamine injections.

The viability of pedicled grafts with radioactive materials may be evaluated by means of two techniques. One consists of the injection of the radioactive material into the graft and the detection of its continued absorption and the other is the observation of the appearance of the radioactive material in the graft after intravenous injection.

The authors injected 0.6 to 0.8 mc. of P^{32} intravenously and determined the ensuing radioactivity over the graft and the control skin. The limb to be detached was occluded with a tourniquet. This test was applied in 5 patients; a radioactivity increase to at least 50 per cent of the normal skin was considered proof of an adequate new blood supply development. Clinical correlation appeared to be satisfactory.

—Karel B. Absolon, M.D.

The Subcutaneous Dermis Graft. NOEL THOMPSON. *Plastic & Reconstr. Surg.*, 1960, 26: 1.

A SERIES of 33 patients with minor facial contour defects treated by subcutaneous dermal grafting is analyzed and the results are illustrated. Properly performed, 90 per cent of such grafts may be expected to take successfully and to yield pleasing results in carefully selected cases.

The histologic changes of 11 biopsied human dermis grafts are considered. Epidermoid cyst formation in dermis grafts is illustrated, and the probable life cycle of such cysts, ending in spontaneous absorption and replacement by fibrous tissue in the great majority, is outlined.

The permanent survival of apparently functional sweat glands in human dermis grafts is illustrated, and some of the implications of this finding are discussed.

This article won a first prize in an essay contest of the Foundation of the American Society of Plastic and Reconstructive Surgery; it gives more hope than heretofore that the subcutaneous dermis graft may, in the future and if well applied, be a useful surgical adjuvant.

In the cases discussed a thin Thiersch graft was first cut freehand from the donor area. Then the remaining skin layers, with as little adherent fat as possible, were excised and used as a free dermis graft.

—Henry S. Patton, M.D.

BREAST

Puerperal Mastitis in the Antibiotic Era (Il problema delle mastiti puerperali in era antibiotica). C. GIORNELLI and T. BAÇAY. *Arch. ostet. gin.*, 1960, 65: 438.

AT THE OBSTETRIC AND GYNECOLOGIC CLINIC of the University of Perugia, Perugia, Italy, in the period from January 1953 through December 1958, 120 cases of mastitis were observed among 4,126 deliveries. The incidence of mastitis ranged from 7 cases in 540 births in 1953 through 23 cases in 567 births in 1954, 26 cases in 610 births in 1955, and 35 cases in 793 births in 1956, to then drop sharply to 21 cases in 749 births in 1957 and 8 cases in 842 births in 1958. This decrease in the last two years of the period is thought to reflect improved hygienic standards in the institute and better training of the mothers in the technique of infant nursing; in fact, only 11 cases of mastitis developed before the mother and child left the clinic.

The preponderance of development of the mastitis in the younger mothers suggests a tendency of the primigravid breast to engorgement and functional

backwardness and inexperience of the young mother in the care of the nursing organ. The predominance of involvement of the right side suggests that, with the usual habit of starting the act of nursing with the right breast, there occurs a "cleaning-out" of the staphylococcus from the mouth of the child before the left breast is introduced into the nursing process.

Of 16 cases examined bacteriologically, the infecting organism was the hemolytic Staphylococcus aureus in 12, the Staphylococcus albus was at fault in 2, and a mixed flora of Staphylococcus aureus, enterococcus, and coliform bacteria was found in the remaining 2 cases.

The tests for antibiotic sensitivity were limited to the staphylococci. It was found that none were sensitive to sulfathiazole, only 2 strains were sensitive to penicillin, and, of the other antibiotics tested, only bacitracin, polymyxin, and chloramphenicol were effective.

Thus the authors conclude that, until some means of combating the bacterial resistance to these therapeutic agents is found, prophylaxis and early recognition of the conditions offer the best prospects for improving results in the handling of this frequently incoercible and, at times, fatal complication of childbirth and of breast feeding of the infant.

—*John W. Brennan, M.D.*

Mammaplasty; Report of a New Technique Based on the Two-Pedicle Procedure. J. O. STRÖMBECK. *Brit. J. Plast. Surg.*, 1960, 13: 79.

THE AUTHOR has combined two previous procedures, the two pedicle operation, in which more regard than usual is paid to the circulation of the breast, and a second operation previously described, in which the nipple is transposed without undermining the skin and in which resection of skin and gland is performed in one piece. He claims for a one stage procedure, even in large hypertrophies, (1) technically a very simple operation; (2) adequate circulation in the remaining glands, tissue, and nipple; (3) no risk of skin necrosis; (4) no sutures in gland or fat; and (5) a cosmetically good, safe result.

The author's observations cover a 2 year period, and there has not been long enough follow-up in relation to lactation or nipple sensitivity. His detailed explanation of his technique is excellent and well photographed and diagrammed.

In summary, the author has devised a one stage operation for hypertrophy of the breasts. The operation transposes the nipple through a two pedicle procedure. The standard pattern is used to obtain the size of the skin flaps preoperatively. A standard skin flap is not undermined. A circular resection of the gland and skin to muscle is done above the areola above the pedicles and a resection through oval tissues in the lower part of the breast. Thirty-seven patients have been operated on and primary results are satisfactory.

—*Henry S. Patton, M.D.*

Management of Inflammatory Breast Cancer. BENJAMIN F. BYRD, JR., and SAM E. STEPHENSON, JR. *South. M. J.*, 1960, 53: 945.

THE AUTHORS NOTE that there is a wide divergence of opinion regarding the best treatment for true inflammatory cancer of the breast. The lesion must be carefully differentiated from ulcerative cancer of the breast with inflammatory changes. The present series comprised 1,140 cases of breast cancer in which there were 19 cases of inflammatory carcinoma. In 8 patients treated by means of radical mastectomy, 6 of whom had postoperative roentgenotherapy, the 5 year survival rate was 0. All of these patients had axillary metastases. In 4 patients who had simple mastectomy, 3 of whom had postoperative roentgenotherapy, the 5 year survival rate was 0. In 7 patients who had no definitive operation, 6 of whom had roentgenotherapy, the 5 year survival rate was 0.

The authors state that at the present time there is no successful preferential treatment for this lesion. However, extensive operation does not seem to offer an improved survival. The manifestations of the tumor-host relationship are discussed and the similarity to the antigen-antibody response is noted.

—*Edward F. Lewison, M.D.*

Eighty-Two Cases of Mammary Cancer Treated Exclusively with Roentgen Therapy. A. HOCHMAN and E. ROBINSON. *Cancer*, 1960, 13: 670.

BETWEEN 1932 AND 1952 the authors treated 82 patients with breast cancer, residents of Jerusalem, by means of roentgen ray therapy alone. The 5 year and 10 year survival rates for the 16 of 82 patients in the operable stages of this disease were relatively satisfactory. However, in all except 1 of the patients who lived longer than 10 years advanced disease ultimately developed, often with severe late radiation damage to the irradiated breast.

The authors conclude that patients in stage 1 and early stage 2 breast cancer may fare better with surgical treatment. Roentgenotherapy is the recommended treatment for the advanced disease.

—*Edward F. Lewison, M.D.*

Adrenalectomy and Hypophysectomy for Advanced Cancer of the Breast. H. J. B. ATKINS, M. A. FALCONER, J. L. HAYWARD, K. S. MACLEAN, and Others. *Lancet*, Lond., 1960, 1: 1148.

PREVIOUSLY this group of investigators evaluated a series of 60 patients with advanced mammary carcinoma treated in equal numbers by combined adrenalectomy and oophorectomy or by hypophysectomy. The present report is concerned with an extension of the series of patients so that now 79 have had adrenalectomy and oophorectomy and 70 have had hypophysectomy.

In all cases, the choice of operation was made by random selection. Operation was withheld in only 6 instances.

A subfrontal approach to the pituitary gland is utilized, the infundibulum is cut, the gland is removed from its fossa, and the fossa is swabbed with Zenker's fluid. In 3 patients death occurred within 20 days of operation and in 1 of these the cause was bleeding from the brachial artery which was involved in the tumor.

Regarding the adrenalectomy, a 2 stage operation is performed. The first stage includes an oophorectomy and right adrenalectomy and the second stage, 7 days later, consists of a left adrenalectomy. Seven deaths occurred within 20 days of these operations.

A significant favoring of the results in patients with hypophysectomy appears later than 3 months after the operation and continues thereafter. This indicates that hypophysectomy has a more favorable effect than bilateral adrenalectomy with oophorectomy. It is also believed that patients with pulmonary metastases causing dyspnea should not be subjected to the 2 stage adrenalectomy. —*John J. Bergan, M.D.*

The Clinical Effect of Norandrostenolone Phenylpropionate (Durabolin) in Metastasizing Mammary Cancer Patients. K. MALMIO, L. HIISI-BRUMMER, and H. HORTLING. *Ann. med. int. fenn.*, 1960, 49: 121.

TESTOSTERONE PHENYLPROPIONATE (norandrostenolone phenylpropionate, NAP, durabolin) was used therapeutically in 83 patients suffering from metastasizing mammary cancer. Improvement and regression occurred in 29 or 34.9 per cent of the cases. The therapeutic effect lasted an average of 11 months. through a range of 4 to 22 months. In 26 cases no previous androgen therapy had been given and 13, 50 per cent, responded favorably.

Traditional androgen therapy was given to 55 patients, prior to the durabolin treatment and 19 or 34.5 per cent responded favorably. This effect lasted an average of 12 months. Durabolin was effective in 6 of 36 cases in which testosterone had been ineffective and also in 10 patients who had had a favorable effect with androgen which had faded away. Altogether, 16, 29.1 per cent, of the 55 patients responded favorably to durabolin. It was of no therapeutic value in 9 hypophysectomized patients.

The side effects of durabolin were very slight and necessitated cessation of therapy in only 2 cases because of furuncles.

In 36 of the 66 cases, durabolin caused a decrease of the estrogen level as measured by the vaginal smear technique. The favorable clinical effect was more frequent among patients whose estrogen effect decreased than among patients in whom it was unchanged. Favorable clinical response, however, was quite often seen when no estrogen effect was observed in the vaginal cytologic finding at the start of the therapy with durabolin.

Durabolin represents definite progress in the treatment of metastasizing mammary cancer when compared with the usual androgen therapy.

—*Ernest D. Bloomenthal, M.D.*

Mammary Sarcoma (Zur Diagnose und Therapie der Mammasarkome). H. WASL. *Klin. Med.*, Wien, 1960, 15: 193.

THE AUTHOR uses 10 cases of his own to illustrate a discussion of mammary sarcomas. These neoplasms, which account for less than 5 per cent of all malignant tumors of the breast, may be divided into five types: spindle cell, polymorphous, round cell, myxo-, and reticulum cell sarcoma. Cystosarcoma phylloides is not included in the discussion. Spindle cell sarcomas, which account for more than a third of all mammary sarcomas, grow more slowly than the other types. They hardly ever metastasize and rarely recur. Polymorphous sarcomas have a greater tendency to metastasize, but they occur very infrequently. Round cell sarcomas tend to infiltrate and to recur. Myxosarcomas, the second most common of the breast sarcomas, grow very slowly. Reticulum cell sarcomas are often poorly outlined. They metastasize readily by either lymphatics or blood vessels.

Mammary sarcomas lie within or adjacent to the breast parenchyma and usually remain freely movable for a long time before they involve the skin or muscle. Metastasis, chiefly hematogenous, is most often to the lungs, liver, brain, and skeleton. Lymph node involvement is uncommon; it is associated mostly with round cell and reticulum cell sarcomas.

Rapid growth without infiltration is the chief clinical feature of these neoplasms. Small, smooth, freely movable sarcomas may mimic benign tumors and diffuse reticulum cell sarcomas or ulcerating spindle cell lesions may resemble carcinoma of the breast. The only certain diagnosis is a histologic one. Nevertheless, the author holds the opinion that, of the tumors which seem benign clinically, only those that grow rapidly or that are associated with enlarged lymph nodes should be removed. Well demarcated tumors which do not increase in size should be observed regularly. Incisional biopsy is contraindicated. Biopsy should be performed under general anesthesia, both to avoid distortion of the tissue by local anesthetic and to permit immediate definitive therapy if frozen sections substantiate the presence of a malignant lesion.

Therapy is surgical: either simple mastectomy or mastectomy with axillary node dissection, depending on the type of tumor, the presence of enlarged axillary nodes or of distant metastases, and the age and condition of the patient. The prognosis is better than for patients with breast carcinoma. The author, whose patients had no local recurrences, believes that inadequate primary therapy accounts for the high local recurrence rate found in the literature. Breast sarcomas should not be shelled out; nor should they be excised by dissection through adjacent seemingly normal tissue. Simple mastectomy should include removal of the pectoralis major muscle and, if the tumor is in the upper outer quadrant, removal of the pectoralis minor muscle also. —*Elmer V. Dahl, M.D.*

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Neurosurgical Applications of Tracheostomy (La trachéotomie dans ses applications neuro-chirurgicales). J. DESCOTES and M. HAGUENAUER. *Lyon chir.*, 1960, 56: 344.

OF 192 TRACHEOSTOMIES, 153 were performed in cases of cranial trauma and the remainder in neurosurgical cases. The frequency of tracheostomies was not high, if it is kept in mind that 1,800 head injuries, including 447 severe ones, were observed during this period. Tracheostomy was reserved for the most serious cases; indeed, 70 per cent of the patients who underwent tracheostomy died, but only in 7 cases, 4 per cent, could direct responsibility for the death be attributed to the tracheostomy. The procedure, although life-saving in many instances, is not free from certain dangers. It must be performed with precision in order to avoid immediate accidents, but its value rests primarily in the quality of the nursing care that is administered subsequently, care which should include meticulous and aseptic endotracheal aspiration. Long term sequelae appeared to be negligible or nil in those who survived. —*Jonas Brachfeld, M.D.*

Complications of Tracheostomy. O. J. KING, JR., and W. W. GLAS. *Rocky Mountain M. J.*, 1960, 57: 36.

HEMORRHAGE, recurrent respiratory obstruction, tracheobronchitis, pneumothorax, tracheoesophageal fistula, apnea, and shock, in that order, were the complications of tracheostomy encountered most frequently by the authors.

Hemorrhage at the operative site with aspiration of blood was the complication encountered most frequently. Focal ulceration of the tracheal mucosa and inflammatory infiltration of the submucosa can be produced by contact with a tracheostomy cannula in as little as 20 hours. Use of the correct cannula, frequent replacement of the cannula, and removal of all irritating crust will tend to minimize this complication.

Incorrect suctioning technique may cause extensive damage to the tracheobronchial mucosa with consequent severe tracheobronchitis. Correct suctioning technique, using a Y tube to break the negative pressure, is mandatory to avoid denuding the tracheobronchial mucosa. Distressing dyspnea is averted by limiting suction to 5 second periods.

Recurrent obstruction was most commonly caused by inspissated secretions in the inner tube. When the inner tube is not replaced, secretions accumulate at the tip of the outer tube; this may require replacement of the entire unit before a tract is well established. Prevention of excess drying of secretions will minimize recurrent obstruction due to crust formation. Obstruction also may occur when the cannula is dislocated, as happens when the tracheal incision is incorrectly placed. Lateral tracheal incisions can be made when the trachea is rotated, and postoperative flexion of the neck then dislocates the cannula out of the trachea.

Tracheoesophageal fistula may occur as an early or a late complication. Acute tracheoesophageal fistula is a result of penetration of the posterior wall and can be avoided by the use of tracheal hooks. Pneumothorax after tracheotomy is usually secondary to operative trauma of the pleural domes.

Shock and death as a complication after tracheostomy may occur. Prolonged asphyxia renders the respiratory center insensitive to carbon dioxide stimulation and the respiratory cycle is then dependent upon the carotid body which is stimulated by anoxia. When anoxia is corrected by tracheostomy, the respiratory cycle is deprived of its stimulus and apnea ensues. The resultant apnea may be transient or prolonged, depending upon the severity of the preceding hypercapnea and anoxia. If untreated, the resultant continued apnea is fatal. Positive pressure oxygen is therapeutic even when marked electrocardiographic changes are present. A small endotracheal tube that fits into the tracheostomy cannula and an anesthesia machine provide an efficient means of oxygenating the patient until spontaneous respirations return.

—*James H. Holman, M.D.*

Neurofibromas of the Airways (Neurinofibrome der grossen Luftwege). K.-L. SCHOBER. *Zbl. Chir.*, Leipzig, 1960, 85: 1066.

TWO PATIENTS with the rare finding of neurofibroma of the bronchial mucous membranes were operated upon within a short period, at the surgical division of the University Hospital of Halle, Saale, Germany. In connection with this the author reviewed carefully the world literature.

Among the benign bronchial tumors the most frequent ones are the adenomas, the much less frequent the fibromas, chondromas, and lipomas.

The classic history of irritating cough, hemoptysis, recurrent pneumonias, and beginning dyspnea should lead to the diagnosis. Bronchoscopy is the best diagnostic tool, as chest films are often misleading. The therapy of choice is thoracobronchotomy with removal of the tumor. —*Hans J. Schweizer, M.D.*

Staphylococcal Pneumonitis in the Postoperative Patient. EDWARD H. MORGAN, LOUIS J. LANCASTER, H. ROWLAND PEARSALL, and G. HUGH LAWRENCE. *Dis. Chest*, 1960, 38: 1.

STAPHYLOCOCCAL PNEUMONITIS was recognized in 13 postoperative patients between 1955 and 1958 at the Virginia Mason Hospital, Seattle, Washington.

The surgical procedures included intracranial, facial, thoracic, cardiac, abdominal, urologic, and gynecologic operations. The onset of the disease occurred in the first 3 postoperative days in 10 of the 13 instances. When a postoperative patient manifests signs of severe respiratory insufficiency, incongruously low temperature, prolonged expiratory phase of respirations despite gross tachypnea and hyperpnea, purulent bloody sputum, and leucocytosis, staphylococcal pneumonitis must be suspected. This suspicion

must be held despite a singular lack of confirmatory roentgenographic changes in the lungs. A gram-stained smear of sputum demonstrating many gram-positive coccal forms adds enough diagnostic evidence to initiate vigorous, aggressive therapy without delay.

In view of the probability that the infecting staphylococcus will prove resistant to the usual antibiotics, the prompt use of vancomycin or ristocetin intravenously is recommended. Because of the gross respiratory insufficiency of obstructive type commonly present in postoperative patients with staphylococcal pneumonitis, inhaled nebulized bronchodilators, intermittent positive pressure breathing devices, and tracheostomy when indicated, have proved their value. Eight of the 13 patients survived.

—James S. Conant, M.D.

The Choice of Methods in the Treatment of Pulmonary Tuberculosis. A. Tuxen. *Acta chir. scand.*, 1960, Suppl. 253, p. 203.

The choice of treatment for pulmonary tuberculosis is not easy. The treatment should be individualized for each patient. Conservative treatment can be utilized alone or can be used in addition to collapse therapy, resection therapy, and combined thoracoplasty and resection.

If the disease is moderate and unilateral, thoracoplasty with or without apicolysis is recommended. Bilateral cavernous disease usually requires thoracoplasty on one side and resection on the other. Ten to 20 per cent of the cavities will be in atypical areas and these will require resection. Resection is the treatment of choice for heart infiltrates also, especially if a tumor cannot be excluded. Today, total lobar disease is rarely seen. Patients with total lobar disease should have a long period of rest, combined with staged procedures. Bronchial tuberculosis, if severe, will also require resection. Thoracoplasty should accompany any large resection in order to avoid compensatory emphysema and reactivation of the disease in the remaining portion of the lung.

A series of 2,316 patients has been treated surgically in Oslo city hospitals since 1932. Small thoracoplasties of 4 to 5 ribs represent 90 per cent of the thoracoplasties performed. Resections have become more popular since the advent of antibiotic therapy. Ninety-one per cent of the patients seen are treated medically. Of those treated surgically there has been a 90 per cent cure rate with a 1.4 per cent mortality for thoracoplasty and an 81 per cent cure rate with a 3.5 per cent mortality for resection.

—Harold M. Unger, M.D.

Treatment of the Tuberculous Lower Lobe Cavity. Kjeld Tørning and Janez Orešnik. *Acta chir. scand.*, 1960, Suppl. 253, p. 45.

The management of the tuberculous lower lobe cavity has been controversial. Resection treatment and collapse therapy have their proponents. The crucial fact to be determined by this study was whether or not chemotherapy must be combined with operation.

Chemotherapy in this series consisted of 4 mgm. of isoniazid and 20 mgm. of para-aminosalicylic acid/kgm. of body weight. Streptomycin was administered in the hospital only in a dosage of 1 gm./day during the first month and 1 gm. 2 times a week for the remaining stay. In 16 patients, pneumothorax was combined with chemotherapy. Fourteen of these patients are cured, 1 had a relapse, and the fate of 1 is unknown. Of 8 patients who were not operated upon, 7 are cured and 1 died of a cerebral hemorrhage. If the patient cannot participate in long term chemotherapy, resection is advised; otherwise, there is a growing tendency to rely on chemotherapy alone.

—Harold M. Unger, M.D.

Surgery in the Management of Pulmonary Tuberculosis. John M. Salyer. *Rocky Mountain M. J.*, 1960, 57: 28.

Since 1949, resection in the management of pulmonary tuberculosis has steadily increased in popularity, and many consider extirpative measures as the best means of treating this disease whenever the postmedical residuals show as surgical lesions. The properly performed segmental resection for localized disease continues to be the procedure of choice, wedge removal being utilized occasionally for small, well localized, peripheral lesions incidental to the primary lobe or segmental resection. The author does not hesitate to resect lesions at an early date when a definite diagnosis cannot be established and if the lesions have some characteristics of neoplasia as well as inflammatory foci. Undiagnosed lesions of this nature are usually explored surgically after the patient has received 7 to 14 days of intensive combined antituberculous therapy. Early postoperative complications that follow resection for pulmonary tuberculosis are usually no more frequent after short periods of chemotherapy than after prolonged administration.

Indications for resection after prolonged chemotherapy include cavitary lesions, cavitary residuals, large caseonodose residuals of 2 cm. or more in greatest diameter, and tuberculous bronchiectasis. After relatively short periods of chemotherapy, the criteria for resection include solitary or multiple lesions for which definite diagnosis cannot be established, the presence of pleural effusion, relatively localized disease, and mixed empyema resulting after spontaneous pneumothorax associated with destroyed lung.

Excisional surgery in the management of pulmonary tuberculosis is not a simple or benign procedure in spite of the fact that in a series of 500 patients, the present mortality is 1 per cent, 0.6 per cent being early operative deaths and 0.4 per cent late deaths due to cor pulmonale. The low mortality rate after pulmonary resection in the treatment of tuberculosis would perhaps never have been thought attainable 10 to 12 years ago. Such is not true when untoward morbidity and complications are estimated after primary surgical measures, although most complications are of little consequence and easily corrected if recognized early and properly managed. Bronchopleural fistula, mixed empyema, operative wound infection, and postoperative spread or dissemination of disease are decidedly on the decrease.

By and large, the author believes that patients who harbor drug resistant organisms and are candidates for excisional therapy should have lobectomy or pneumonectomy performed, avoiding segmental or wedge resections. *—James H. Holman, M.D.*

Pleural Drainage with Air Replacement as a Management of the Pleural Cavity Following Pulmonary Resection. N. OKADA, N. KOMAI, H. UEYAMA, K. TAKENAKA, and Others. *Wakayama M. Rep.*, 1960, 5: 37.

THE AUTHORS DESCRIBE a method of pleural cavity drainage after pulmonary resection which they believe to be superior to the present commonly used method. Their method involves the regulated infusion of air into an anteriorly placed catheter so as to maintain a desired intrathoracic pressure. Drainage is effected by means of a posteriorly placed catheter connected to a suction apparatus with a pressure of −20 to −50 cm. of water. The anterior catheter is connected to a pressure controlling device consisting of a glass bottle containing sublimate solution and a graduated glass pipe.

The intrathoracic pressure which was most desirable in its effect upon cardiopulmonary functions was determined by experiments in which dogs were subjected to right upper lobectomy and the relationship between intrathoracic pressure and right atrial, pulmonary artery, vena caval, and aortic pressure as well as ventilatory function was observed. The most desirable level of intrathoracic pressure was found to lie between −8 and −15 cm. water, depending upon several factors, the most important being the amount of air leakage from the lung postoperatively.

The authors state that this method was used with satisfactory results in 56 patients who underwent pulmonary removal, with the exception of 3 patients with hemothorax caused by obstruction of the dorsal catheter and 2 in whom pulmonary fistula was caused by too strong negative pressure or operative failure.

—*C. Thomas Fitts, M.D.*

HEART AND PERICARDIUM

Operative Approach to Transposition of the Great Vessels. ALLAN L. TOOLE, WILLIAM W. L. GLENN, WARREN H. FISHER, RUTH WHITTEMORE, and Others. *Surgery*, 1960, 48: 43.

DURING THE PAST 13 YEARS 72 cases of transposition of the great vessels were observed at the Yale Medical Center in New Haven, Connecticut. Fifty-four patients died. This report is a detailed review of the clinical features and pathologic findings in 32 patients who were operated on and in those who were not. The patients were classified on the basis of associated cardiac lesions.

The two major problems limiting survival in patients with transposition are (1) inadequate mixing of the pulmonary and systemic circulations and (2) pulmonary congestion. The evidence suggests that a patent ductus arteriosus may contribute to pulmonary congestion and except in those with pulmonary stenosis, it seems logical to recommend that this structure be interrupted at the time other palliative procedures are performed.

Palliative (partially corrective) surgical procedures have been proposed as the initial operation for each of 4 groups. It is hoped that a curative procedure will eventually be possible in many patients with transposition who, with the aid of previously performed palliative procedures, have been able to survive infancy and early childhood. It is anticipated, however, that for the time being patients with a single ventricle, 33 per cent, will be candidates for a palliative procedure only.

—*James S. Conant, M.D.*

Congenital Aneurysms of the Aortic Sinuses with Cardioaortic Fistula. STEPHEN A. KIEFFER and PAUL WINCHELL. *Dis. Chest*, 1960, 38: 79.

THIS REVIEW of aneurysms of the aortic sinuses brings to 78 the number reported in the literature. Ten patients from the University of Minnesota Hospitals in Minneapolis with clinical or autopsy evidence of this malformation are included and their cases are presented in detail.

In at least 6 cases, clinical history and autopsy findings were compatible with a cardioaortic fistula present at birth. Most commonly the unruptured aneurysm is relatively asymptomatic, the patient being aware only of a heart murmur or mild dyspnea. In contradiction to repeated impressions in the literature, rupture of the aneurysm was not a sudden dramatic event in 9 of the 10 cases here reported. The typical continuous murmur heard after rupture is differentiated from that of patent ductus arteriosus by location and quality. Findings on the electrocardiogram, the roentgenogram, and at cardiac catheterization are reviewed. The definitive diagnosis can be made by angiocardiography or retrograde aortography.

Successful surgical closure of a ruptured congenital aortic sinus aneurysm has been reported in 8 cases within the past 2 years. Cardiopulmonary bypass with a pump-oxygenator and retrograde coronary perfusion were utilized. Rupture of the aneurysm does not result in immediate death, except in the extremely rare instances of rupture into the pericardial sac. The usual patient can be managed with medical therapy for several years if need be. However, with the availability of the pump-oxygenator, definitive demonstration of a cardioaortic fistula must be considered a strong indication for its closure by means of "open heart" techniques.

—*James S. Conant, M.D.*

Surgical Treatment of Pulmonary Stenosis Using Extracorporeal Circulation. FRANK GERBODE, J. KEITH ROSS, GEORGE A. HARKINS, and JOHN J. OSBORN. *Surgery*, 1960, 48: 58.

FIFTY-FIVE CONSECUTIVE OPERATIONS have been performed at the Stanford University Hospital in San Francisco, California for the correction of pulmonary stenosis. In the last 29 cases extracorporeal circulation was employed.

Although congenital infundibular stenosis had been detected prior to operation in only 2 of the 55 cases, of the 29 patients treated for "pure" pulmonary valve stenosis by the transventricular approach 16 exhibited infundibular narrowing by muscle hypertrophy. It was considered necessary to resect muscle from the outflow tract in 13 of these patients, whose ages varied from 5 to 38 years.

Of 18 patients treated earlier by the transarterial method it was later necessary to correct an infundibular stenosis in 4 by the transventricular method.

The authors consider direct vision of the infundibulum to be the only reliable method of determining the

presence and extent of secondary stenosis of the outflow tract.

Since extracorporeal circulation and the transventricular approach have been employed, there have been no deaths in the last 16 cases and postoperative morbidity decreased. —*James S. Conant, M.D.*

Partial Replacement of the Mitral Valve with Synthetic Fabric. HAROLD KING, CHIEN SHENG SU, and JOE G. JONTZ. *J. Thorac. Cardiovasc. Surg.*, 1960, 40: 12.

WHETHER healing would occur and good function result when plastic cloth was substituted for part of an actively moving valve subjected to high pressure changes is not known.

In one group of animals, the central and basal portion of the aortic leaflet of the mitral valve was incised close to and essentially parallel to the annulus. The defect was then grafted with a slightly larger piece of nylon or teflon cloth. Five animals operated upon tolerated partial replacement of the major leaflet well and lived an active kennel life until the time of sacrifice.

Complete replacement of the major leaflet was carried out on 5 animals. Nylon cloth was used in 2; teflon cloth was used in the next 3 dogs. Neither of the synthetic fabrics used in this experiment was entirely suitable for valve replacement. Both fabrics were difficult to work with because of their inelasticity and relative inflexibility.

The results demonstrated that synthetic fabrics could be used successfully for partial replacement of the major leaflet of the mitral valve. When the graft was placed in the thicker basal part of the valve, better results were obtained. Attempts to replace completely the major leaflet of the mitral valve were all eventually unsuccessful.

—*Robert A. Nabatoff, M.D.*

Complete Replacement of the Mitral Valve. NINA S. BRAUNWALD, THEODORE COOPER, and ANDREW G. MORROW. *J. Thorac. Cardiovasc. Surg.*, 1960, 40: 1.

THE EXPERIENCE in the authors' clinic, as well as at other centers, has shown that, in a large proportion of patients with mitral regurgitation, reconstructive procedures utilizing existing valve tissue have been followed almost universally by disappointing clinical and hemodynamic benefit at the expense of significant operative risk. In the present report the design and methods of fabrication of a prosthetic valve constructed of flexible polyurethane foam are presented and the application of this valve in the surgical treatment of 2 patients with mitral regurgitation is described. These valves were used for complete replacement of the mitral valve in 27 dogs.

Experience with reconstructive operations indicated that the technical problems of insertion of the prosthesis in patients would be far simpler than in the normal dog. In the design of the prosthetic valve described it was considered that the degree of flexibility of the leaflets was of prime importance. Early experience indicated that the length of the chordae was critical and that it was difficult if not impossible to correctly estimate their optimal length when they were sutured to the papillary muscles or ventricle before the valve itself was inserted and functioning.

Many plastic materials were evaluated in the fabrication of valves. The open cell polyurethane foam surface eventually employed was selected because it had been shown to be nontoxic and to induce a minimal inflammatory response. The material has the additional advantage that it can be molded easily without special equipment. In each of the patients in whom the valve was inserted a small diastolic pressure gradient was present afterward. Preliminary studies indicate that a prosthesis molded with the leaflets in a more closed position may be preferable. The surviving patient remains well after discharge from the hospital. A faint apical systolic murmur is audible. —*Robert A. Nabatoff, M.D.*

Long Term Influence of the Beck Operation for Coronary Heart Disease. BERNARD L. BROFMAN. *Am. J. Cardiol.*, 1960, 6: 259.

MORE THAN 600 patients with coronary heart disease have been operated on by Beck during the past 10 years with an over-all operative mortality of approximately 5 per cent. This report is concerned with a series of 110 patients surviving operation in the 2 year period, 1954 and 1955. The operation performed was a more or less standardized surgical procedure which evolved from both the Beck II operation and various modifications of the Beck I operation.

All patients were suffering from angina pectoris. The average age was 47 years and all but 5 were men. The duration of symptoms averaged 2.5 years. In 40 per cent of the patients there had been two or more episodes of acute myocardial infarction. Operation was precluded for at least 4 to 6 months after acute myocardial infarction.

During the first year after operation 6.4 per cent died and within 2 years a total of 10 per cent had died. Of the 86 living patients the critical result is considered excellent in 50 per cent and good in 40 per cent. —*George R. Holswade, M.D.*

Bacterial Endocarditis Following Surgery for Congenital Heart Disease. LEONARD M. LINDE and HENRY L. HEINS. *N. England J. M.*, 1960, 263: 65.

BEFORE THE ANTIBIOTIC ERA subacute bacterial endocarditis was almost invariably a fatal complication in congenital and acquired heart disease. With the advent of antibiotic therapy the incidence and mortality of bacterial endocarditis progressively decreased but other more resistant organisms, particularly the staphylococcus, assumed etiologic significance. The classic clinical picture of bacterial endocarditis is not seen with infection in the early postoperative period. Altered host resistance, sites of intracardiac trauma, infections with unusual bacterial strains, and other factors result in a new and rapidly progressive disease.

This report is concerned with pathogenesis, clinical picture, bacteriology, treatment, and prognosis. This study includes all patients in whom bacterial endocarditis was diagnosed after operation for congenital heart disease. A clinical and laboratory diagnosis was established in all 7 and autopsy confirmation in 2. After 550 cardiac operations there were 7 cases of bacterial endocarditis. Five of the 7 occurred in a group of 205 patients in whom the extracorporeal heart pump was utilized during the surgical repair.

All of the patients demonstrated high fever, but splenomegaly, hepatomegaly, petechiae, clubbing, Osler's nodes, embolic phenomena, weight loss, leucocytosis, and anemia were absent. Most of the organisms were highly resistant to the commonly employed antibiotics. The staphylococcus appears to be playing the leading etiologic part. Improved techniques have essentially eliminated pump contamination as a factor, but the remaining sources of infection stress the continued indications and need for consistent sterile technique in every part of the cardiac surgical procedure.

The advantages of prophylactic antibiotic therapy in operations on the heart as compared to avoidance of such therapy, with appropriate treatment of infections as they arise, has yet to be evaluated. In this series the high incidence of the disease suggests that prophylaxis may not be a valid indication for repair of physiologically insignificant heart lesions. In cases occurring after cardiac operation, the combination of lowered host resistance and unusually resistant bacterial species results in a mortality from 20 per cent to as high as 90 per cent.

—Robert A. Nabatoff, M.D.

ESOPHAGUS AND MEDIASTINUM

The Use of Vasopressin (Pitressin) in the Control of Bleeding from Esophageal Varices. STANLEY SHALDON and SHEILA SHERLOCK. *Lancet*, Lond., 1960, 2: 222.

THE EMERGENCY MANAGEMENT of bleeding from esophageal varices in patients with cirrhosis of the liver is largely unsatisfactory. The introduction of the Sengstaken tube in 1950 has made relatively little difference in the treatment of these patients.

In 1956, Kehne and associates reported that vasopressin (pitressin) would control hemorrhage from esophageal varices by lowering portal pressure. The authors have pursued this concept and herein report their experience with 8 patients treated in the Department of Medicine of the Royal Free Hospital, London, England. All of the patients had failed to stop bleeding after blood transfusion and none was considered fit for emergency surgical intervention.

Twenty units of vasopressin in 1 ml. was diluted to 100 ml. with 5 per cent dextrose solution and administered intravenously to the patient over a 10 minute period. Control of bleeding was determined by repeated aspirations through an indwelling gastric tube, as well as by the response of the patient's pulse and blood pressure. Portal pressure was measured indirectly in 5 patients by percutaneous splenic puncture and in 2 patients by measurements of the pressure in the wedged hepatic vein.

Before treatment with vasopressin, there had been clinical evidence of bleeding for an average of 16 hours, through a range of 6 to 72 hours, and a mean of 2,500 ml. of blood, through a range of 1,000 to 5,000 ml., had been transfused. After administration of the vasopressin, aspirated gastric fluid became clear of blood within 1 hour and the pulse and blood pressure were maintained without further transfusion in all cases. In 3 of the 8 patients, hemorrhage did not recur. In the other 5, bleeding recurred within 4 hours to 8 days and, although temporary benefit was gained from intravenous vasopressin given as often as every 4 hours, in some instances, 4 of these patients eventually died of massive hemorrhage.

In the 7 patients in whom the portal pressure was measured, there was a fall of 46 per cent or 14 mm. Hg; through a range of 11 to 18, after treatment with the vasopressin. *—Harvey N. Lippman, M.D.*

Granulomas and Pseudotumorous Adenopathies of the Mediastinum, a Cause of Dysphagia (Granulomes et adenopathies pseudo-tumorales du médiastin). N. OECONOMOS, H. LE BRIGAND, M. MERLIER, and A. ROUSSEL. *Poumon*, 1960, 16: 323.

THE AUTHORS report 8 new cases of granulomas of the mediastinum thus bringing the total number of cases in the literature to 87. These lesions comprise about 1 to 5 per cent of mediastinal tumors. In 67 per cent of the reported cases the granulomas were located in the superior mediastinum. The size of the tumors varied from 3 to 7 cm. in the largest diameter.

Of the 8 new cases reported by the authors, 3 of the granulomas were tuberculous. One was partially tuberculous and partially of nonspecific inflammatory nature. Four consisted of subacute nontuberculous inflammatory tissue.

Two patients had fever as a presenting symptom. One each had hemoptysis, vomiting, dysphagia, cyanosis of the face, and swelling of the arm as presenting symptoms. One tumor was discovered by roentgenography in an asymptomatic patient.

All patients were subjected to thoracotomy. In 1 is was possible to excise the entire mass. In 5 the mast was incised and caseous material drained. In 2 a biopsy only was possible. In 5 cases cultures were made of the material obtained at operation. All these cultures were negative.

Antibiotic therapy was used during the immediate postoperative period in all patients. Those in whom the diagnosis was tuberculosis had long term antibiotic therapy. Improvement was observed in 7 of the author's patients during short follow-up periods.

The commonest cause of these granulomas as reported in the literature is nonspecific inflammation. Only 9 of the reported cases were proved to be tuberculosis. Rare causes are mycosis and silicosis. Often no cause at all is found.

Of the 87 cases reported in the literature, excision was carried out in 37. In most of the remainder incision and drainage or biopsy was performed. Some of the patients were not treated.

—Frederick W. Preston, M.D.

Surgical Significance of the Thymus. DAVID BOYD and FRANKLYN P. GERARD. *N. England J. M.*, 1960, 263: 431.

ELEVEN PATIENTS with proved myasthenia gravis were treated by thymectomy after they failed to respond to adequate medical treatment. Thymomas were present in 4 of these patients, the lesion in 1 was malignant. Four other patients had thymic hyperplasia.

Thymectomy for treatment of myasthenia gravis was performed in 7 patients in the absence of roentgenologic evidence of a mediastinal lesion. All 7 were women 35 years of age or less in whom the disease had

been present for less than 5 years and all are alive 5 years after operation.

The problem of thymoma not associated with myasthenia gravis is serious. In addition to the extremely low survival rate an important factor is the lack of associated myasthenic symptoms. Many of these lesions are asymptomatic, the mass being discovered on routine roentgenologic examination.

The pathologic nature of the underlying lesion cannot be discovered roentgenologically. The treatment is surgical excision, if possible, or at least thoracotomy and biopsy. Radiation therapy offers little more than brief palliation. Despite the poor prognosis, thymic tumors should be excised if possible, for life expectancy without surgical removal is short.

Thymoma must be considered a highly malignant lesion as evidenced by the fact that half of the patients with thymomas who were operated on were dead within 6 months. —*Stephen A. Zieman, M.D.*

DIAPHRAGM

Hiatus Hernia. N. R. BARRETT. *Brit. M. J.*, 1960, 2: 247.

THE AUTHOR divides hiatal hernias into three types:

1. In paraesophageal hernia the cardia is normally placed and the gastric curve of the stomach together with the gastrocolic omentum herniates into a peritoneal sac in the mediastinum and through the esophageal hiatus.

2. Sliding hiatal hernia, which is ten times more common than the paraesophageal variety, is a hernia *en glissade* and produces incompetence of the cardia.

3. In "mixed" or "rolling" hiatus hernia features of both of the first two varieties are present. In regard to congenital short esophagus, the author states that he has never seen a patient in whom all the coats of the esophagus, normal in other respects, were congenitally short and in whom a part of the stomach, as a consequence, lay in the mediastinum.

The pathogenesis of esophageal ulceration, bleeding, and stricture in hiatal hernia is discussed and is ascribed to the reflux of gastric contents through a defective cardia in the majority of cases. These lesions are found almost entirely within the group of sliding hiatal hernias.

In discussing treatment the author confines his attention to those cases with stricture secondary to esophagitis. Two principles are to be adhered to: (1) Further reflux of acid pepsin must be prevented and (2) the lumen of the gullet must be re-established.

The merits of the various surgical procedures used to accomplish these conditions are considered matters for individual decision.

The author concludes that strictures due to esophagitis should not be dilated unless one can effectively and permanently prevent reflux of acid pepsin at the same time. —*C. Thomas Fitts, M.D.*

Postoperative Diaphragmatic Hernia. J. HARVEY JOHNSTON, JR., and GEORGE E. TWENTE. *Ann. Surg.*, 1960, 151: 805.

AS A PART OF the popular Allison technique of transthoracic hiatal hernia repair a counterincision through the left leaf of the diaphragm is made. An early and late postoperative complication of this diaphragmatic incision has been dehiscence and herniation of the abdominal viscera, particularly the stomach, into the left pleural cavity.

The authors present 4 cases of this complication after an Allison hiatal hernia repair from the University of Mississippi School of Medicine in Jackson. In 1 patient incarceration of the stomach through the diaphragmatic defect occurred on the fifth postoperative day. In the remaining 3 patients symptoms from dehiscence of the diaphragmatic incision developed 4 months, 18 months, and 2 years after transthoracic hiatal hernia repair. Incarceration of stomach, spleen, and omentum; perforation of a gastric ulcer through the herniated stomach wall into the pleural space with resulting empyema; and severe anemia were the respective complications of the latter 3 patients. In each instance reoperation through the previous thoracotomy incision, reduction of the hernia, and closure of the diaphragmatic defect by imbrication was successful.

The authors recommend initial closure of the diaphragmatic counterincision by imbrication and prolonged postoperative nasogastric decompression in order to avoid this potentially lethal postoperative complication. —*James S. Conant, M.D.*

SURGERY OF THE ABDOMEN

ABDOMINAL WALL, PERITONEUM, AND HERNIA

Hematoma of the Rectus Abdominis Muscle in Pregnancy (L'ematoma del muscolo retto addominale in gravidanza). N. RAGUCCI. *Arch. ostet. gin.*, 1960, 65: 346.

THE PATIENT was a 38 year old woman in her third pregnancy.

Ten days before admission to the author's service the patient began to cough and 3 days previously pain developed in the left hypochondrium. On the morning of admission, after an attack of coughing the patient's pain became acute, and there was cold sweating, vomiting, and fainting.

Palpation was extremely painful and muscular resistance was pronounced, preventing satisfactory examination of the abdominal organs.

After a transfusion of 500 c.c. of blood and analeptics a puboumbilical incision was made and a vast preperitoneal hematoma, posterior to the fascia propria of the left rectus abdominis muscle was uncovered. The source of the bleeding could not be determined.

The hematoma was largely evacuated and the surgeon performed a cesarean section to spare the patient the stresses of spontaneous delivery; a living child weighing 3,350 gm. was procured. Recovery was uneventful.

Causal agents of the patient's disorder are thought to be the age and pluriparity, gestosis, obesity, and general asthenic habitus of the patient and a rare vascular anomaly of the epigastric arteries.

The author suggests that the spreading apart of the recti muscles with each succeeding pregnancy produces a tension on these communications, and it is at this point that the vascular rupture occurs.

—John W. Brennan, M.D.

Prevention of Adhesions by Intra-abdominal Instillation of Prednisolone Acetate (Adhaesionsverhuetung durch intraabdominale Instillation von Prednisolon-Acetat). P. N. EHLERS and H. GRIMSEHL. *Langenbecks Arch. klin. Chir.*, 1960, 293: 612.

ANIMAL EXPERIMENTS on 250 rats were set up. After crushing injuries to their cecum, instillation of 0.5 mgm. of prednisolone acetate prevented the formation of adhesions in 80 per cent of the cases; thus, the experiments of Thomashek, who used hydrocortisone acetate, were confirmed.

Of rats who received 10 mgm. of prednisolone acetate, 78 per cent showed no adhesions at all; 13 per cent had only minimum omental adhesions; and 9 per cent showed conglutination of the cecum with surrounding bowel loops. Rats treated with 1 mgm. of prednisolone acetate showed no adhesions in 74 per cent; 15 per cent had negligible omental adhesions; and 11 per cent showed conglutination of the cecum and bowel loops.

In cases in which 0.5 per cent prednisolone acetate was used, there were no adhesions in 82 per cent; 8 per cent had minimal omental conglutination; and 10 per cent had adhesions of the cecum and surrounding bowel loops.

—Otto Weiss, M.D.

Experiences with the Surgical Treatment of Inguinal Hernia in the Child. CHARLES E. DAVIS, JR. *Am. Surgeon*, 1960, 26: 470.

THE PROCEDURE of herniorrhaphy in infants and children has been well established during the past decade and the technique more or less standardized, particularly as far as the major aspects are concerned. It now is the most frequently performed operation of infancy and childhood.

The technique employed by the author, in essence in all cases, has been that previously favored, emphasizing minimal dissection with high ligation of the sac and as little cord disturbance as possible. With this concept there is uniform agreement. If the sac is short, it is resected in toto; but since most of them extend into the distal part of the scrotum, the procedure employed is transection and no effort is made to eliminate the distal component except when there is an accumulation of fluid in the tunica vaginalis. In that case, only a small window is removed in the relatively avascular anterior portion to facilitate evacuation of the fluid. Several fine silk sutures are used to approximate the conjoined muscle to the shelving edge of the inguinal ligament.

Possibly the most important and certainly the most intriguing aspect of this study has been an attempt to evaluate that most controversial feature of all, namely, the necessity of bilateral inguinal exploration when a child presents with a unilateral hernia. Increasing evidence has been accumulated demonstrating that there is a significant chance for a child with a unilateral operation to manifest subsequently a hernia on the contralateral side necessitating a second procedure. Because of the high incidence of a second hernia developing contralaterally in the last several years, the author has been performing more and more elective bilateral procedures when only 1 hernia is noted. The controversial issue on which there has not been any general agreement has been at what age one should abandon bilateral exploration of this type. The author states that the crucial age of 6 years should be the dividing line.

—Ely Elliott Lazarus, M.D.

Comments on the Treatment of Strangulated Hernias. ARNE ARNESEN. *Acta chir. scand.*, 1960, Suppl. 253, p. 53.

A TOTAL of 1,637 patients with hernia was treated surgically from 1949 to 1958. Of 146 with incarcerated hernia, 107 had viable intestine whereas in 36 the intestine was gangrenous. In good risk patients, herniotomy and repair is the treatment of choice. In poor risk patients, readjustment of the fluid balance and gastric suction are indicated. In the severely ill patient with a gangrenous bowel, enteroenterostomy through a small laparotomy incision performed under

low spinal anesthesia is the procedure of choice. If symptoms of perforation and inflammation of the incarcerated bowel occur, incision of the hernial sac may be performed, and any fistula which may occur can be closed if it does not close spontaneously when the patient has recovered from the acute illness. In the desperately ill patient, trocar suction through the enteric hernia sac may be necessary, with later enteroenterostomy and fistula closure if the patient survives. —*Harold M. Unger, M.D.*

GASTROINTESTINAL TRACT

The Value of Gastric Cytology in Benign Affections of the Stomach (Valore semeiologico della citologia gastrica nelle affezioni non neoplastiche dello stomaco). G. TIRELLI. *Arch. ital. mal. app. diger.*, 1960, 27: 201.

PAPANICOLAOU'S METHODS of cell study have recently been extended to the study of desquamated gastric cells. Most of this work has been directed toward the diagnosis of stomach cancer. In this study the author has investigated 44 patients without gastric cancer in an attempt to learn something of the cells of the normal stomach, and to find out if the cell picture, or gastrocytogram, varies enough in hyperchlorhydric and hypochlorhydric states to be diagnostic.

Gastric washings were obtained after the stomach was cleaned out and alkalinized saline solution was instilled. The liquid was centrifuged, and the sediment fixed in 20 per cent formalin. Slides were stained with the May-Grünwald-Giemsa technique.

The author found that there are several types of cells in the normal stomach: cylindrical epithelial cells, glandular parenchymal cells, accessory parenchymal cells, macrophages, and leucocytes. These cells are distinguishable from each other by the size and shape of the nuclei, the color of the cytoplasm, the presence of granulations, and other histologic criteria. The cylindrical epithelial cells, which are mainly from the villi, are reduced in hyperchlorhydria and increased in hypochlorhydria. The glandular cells are increased in hyperchlorhydria and decreased in hypochlorhydria. Leucocytes are rare in the normal state, variable in hyperchlorhydria, and numerous in hypochlorhydria.

Photomicrographs of representative gastric cell slides are included. The author concludes that it is possible to arrive at a differential cytologic diagnosis. He plans to study cells histochemically as a possible further aid. —*William B. Gallagher, M.D.*

Serum Amylase in Peptic Gastroduodenal Perforation. FRANK A. ROGERS. *California M.*, 1960, 93: 6.

THE PREOPERATIVE SERUM AMYLASE was elevated to 200 Somogyi units or more in 16 per cent of 1,000 patients with perforated peptic ulcer verified by operation. Such elevations are probably due to lymphatic absorption of pancreatic secretion that has leaked into the peritoneal cavity.

Patients with elevated serum amylase readings had a 32 per cent mortality, compared to a 10.6 per cent mortality for patients with normal amylase values. For the 18 patients with serum amylase values over 600, the mortality rate was 73.3 per cent.

There was a tendency for the serum amylase levels to be increased more frequently in patients with larger perforations, in those with larger amounts of free fluid in the peritoneal cavity, and in those whose perforations were of longer duration. A comparison of nighttime and daytime perforations showed no difference in the percentage of patients with high serum amylase levels, suggesting that recent ingestion of food is not a factor in elevation of serum amylase. In patients with elevated serum amylase, the incidence of significant clinical shock preoperatively was four times greater than in those with normal serum amylase.

Caution is urged in deferring operation for suspected perforated ulcer on the basis of an elevated serum amylase. Gastric roentgenograms utilizing opaque media and the use of peritoneal tap are suggested as possible additional aids in differentiating this condition from pancreatitis.

—*Stanley W. Tuell, M.D.*

Various Operative Methods in the Surgical Treatment of Gastric Carcinoma (Die Beurteilung der verschiedenen operativen Methoden in der chirurgischen Behandlung des Magenkarzinoms). W. KÖLE and L. KRONBERGER. *Klin. Med.*, Wien., 1960, 15: 316.

THE SURGICAL TREATMENT of gastric carcinoma up to the present time has been unsatisfactory; the 5 year cure rate ranges from 3.2 to 6 per cent. The methods used have been: partial resection with a Billroth I or II anastomosis; total resection with the Roux en Y type of intestinal anastomosis or Longmire's interposition of the jejunum; and radical resection with removal of the nodes, spleen, pancreas, and colon. The authors attempt to re-evaluate the various procedures in a 10 year study of 600 cases.

Partial resection combined with a Billroth I or II anastomosis is satisfactory for ulcers but is not indicated for gastric carcinoma. The resection should be performed at least 5 cm. from the tumor, preferably with the use of frozen section controls. In treating pyloric and antral carcinoma, it is permissible to leave a small portion of the cardia. In order to minimize postoperative disturbances of protein and fat resorption the Billroth II anastomosis is used. Carcinoma of the gastric cardia presents an operative problem because a wide portion of the lower esophagus must be removed as well as a large portion of the stomach. Occasionally it is possible to preserve a portion of the antrum, which is important for physiologic function. The authors close the antrum in three layers and then create an end-to-side anastomosis with the esophagus. The antrum is then fixed to the diaphragm or, in the case of a higher anastomosis, to the mediastinal pleura. During the last 3 years, a double lumen gastric tube has been used with success to remove secretions and introduce nourishment, especially proteins. When the entire stomach is involved, a compromise is made rather than performing the total resection advocated by Holst. When the lymph nodes are involved, the total resection in general accomplishes no more than the subtotal resection. Several types of reconstruction are possible after a total resection. In the beginning a retrocolic end-to-side esophagojejunostomy with a Roux en Y anastomosis was used; later, a retrocolic end-to-side esophagojejunostomy with a Braun's anas-

tomosis was used predominantly. An extended resection is used when surrounding organs are involved, i.e., an extirpation en bloc resection. Principally, a curved incision in the upper abdomen is used, a thoracoabdominal one in the seventh intercostal space being used when the esophagus is involved.

An exact follow-up procedure was carried out on 20 patients. The follow-up included a history, a roentgenographic examination, intragastric *p*H studies, a liver function test, protein determination, a hemogram, and electrolyte study. Most patients complained of mild burning in the esophagus. In 18 patients a good anastomosis was demonstrated by roentgenographic examination. The hemograms varied greatly. The possibilities of roentgenotherapy in postoperative treatment are discussed briefly.

—Andrew P. Adams, M.D.

Hypoglycemic Symptoms Following Gastrectomy. Yoshio Akiya and Monoru Hirota. *Yokohama M. Bull.*, 1959, 10: 318.

Hypoglycemia resulting from a variety of causes related to gastrectomy has been utilized as an explanation for the postgastrectomy syndrome. To determine this relationship, glucose was administered intravenously and orally and the symptoms during and after the administration were observed while the blood sugar levels were determined. After intravenous therapy, symptoms developed in patients only when large doses of glucose were utilized. Although the time interval was different, the patterns of glucose levels and symptoms were similar with the oral and the intravenous routes. After studying all the cases, the authors concluded that there was no relationship between the symptoms and the hypoglycemia and glucose curves. *—Harold M. Unger, M.D.*

Meckel's Diverticulum. William S. Moskovitz, Carl W. Hughes, and Warner F. Bowers. *Arch. Surg.*, 1960, 81: 36.

This is a study of 20 cases of Meckel's diverticulum observed during a 37 month interval. Detailed reports are recorded of 5 patients who had serious complications of the diverticulum. The case summaries are supported by photomicrographs and roentgenograms.

The first patient had acute perforation, abscess, intestinal obstruction associated with aberrant gastric mucosa, and a carcinoid. Perforation resulted from acid peptic digestion in the area of the gastric mucosa.

The second case was complicated by perforation but on a mechanical basis. The diverticulum had a narrow base which initiated a closed loop obstruction. In the third case a combination of peritonitis and bleeding was present. A perforated appendix could have accounted for the peritonitis but the bleeding probably resulted from ulceration of gastric mucosa in the Meckel's diverticulum.

The fourth patient had an umbilical hernia and a persistent omphalomesenteric duct. The fifth patient had an intussusception with a Meckel's diverticulum as the leading point.

Some of the complications of Meckel's diverticulum are the result of heterotopic tissue, usually gastric mucosa. Bleeding and perforation may occur. The diverticulum itself is liable to complications, including those of inflammation, obstruction, and intussusception. Obstruction can lead to perforation, peritonitis, and abscess formation.

The specific diagnosis is rarely made preoperatively. Usually the clinician makes a diagnosis of one of the complications of diverticulum of the small intestine. Meckel's diverticulum is one of the most common causes of infants' gastrointestinal hemorrhage.

The authors recommend exploration of the terminal small bowel, especially in cases in which the diagnosis of appendicitis has been made and the exploratory findings do not support the diagnosis.

—Richard L. Lawton, M.D.

Acute Appendicitis with Perforation. R. Randolph Bradham, Frederick E. Kredel, and James F. Green. *J. Am. M. Ass.*, 1960, 173: 1342.

The authors analyzed the case histories of 98 patients who had had appendicitis with perforation and were treated at Roper Hospital, Charleston, South Carolina between January 1950 and January 1959. The purpose of this report is to define some of the symptoms and findings that may help to predict impending perforation in patients suspected of having acute appendicitis and to discuss the management of perforated appendicitis.

Pain localized to the right lower quadrant was present in 60 patients. The frequency with which symptoms occurred was as follows: pain in 97 patients, nausea in 82, vomiting in 77, diarrhea in 19, constipation in 13, rebound tenderness in 70, voluntary guarding in 75, and true muscle spasm in 59. Oral temperature was above 100 degrees F. in 62 patients, and white blood cell counts were greater than 10,000 per cu. mm. in 81.

An immediate operation was performed on 93 patients. The primary operation was appendectomy in 81 patients, appendectomy with appendicocecostomy in 11, and drainage of appendiceal abscess in 1. Two of the 4 patients who died were in the nonoperative group. Thirty patients received antibiotics intraperitoneally; 63 patients did not. The average duration of postoperative febrile course was 5 days in the former group and 7.1 days in the latter. The average duration of postoperative hospitalization was 11.7 days for the former group and 12.8 days for the latter. In the cases in which cultures were obtained and reported, Escherichia coli was the predominant organism followed by Aerobacter aerogenes and alpha hemolytic streptococcus. The antibiotic irrigation solution was penicillin and streptomycin in 23 of the cases. In this series, children did not seem subject to earlier perforation than did adults; however, the over-all incidence of perforation was much higher in children than in adults. The authors incline to favor immediate operation although recognizing that a brief delay for preoperative preparation is desirable in some cases and that in certain circumstances interval appendectomy is best. *—Stephen W. Carveth, M.D.*

Recurrent Acute Intussusception. Bernard E. Herman and Jerrold Becker. *Surg. Clin. N. America*, 1960, 40: 1009.

In reviewing a compilation of 167 cases of recurrent acute intussusception most of which occurred in chil-

dren, the authors found that the recurrence rate varied from 1 to 12 per cent. The total number of intussusceptions in the series was 1,211 and the over-all rate of recurrence was 4.1 per cent. An addendum mentions reports of an additional 372 cases of intussusception that indicate recurrence rates of 3.3 per cent after surgical reduction and 12 per cent after hydrostatic reduction.

Definite lesions were found in 20 per cent of the cases of recurrent acute intussusception; a figure of only 6 per cent in primary cases is cited. The most frequently found lesions were polyps and Meckel's diverticulum, and the most common anatomic location of recurrent intussusception was the ileocolic region.

A classic symptom is intermittent cramps that are separated by periods of comfort. Vomiting occurs rather early, and bloody stools are frequently found. A sausage-shaped abdominal mass can be palpated in most cases.

If there are no signs of small bowel obstruction and if there are no physical signs indicative of peritonitis or gangrenous bowel, the authors prefer to proceed with barium enema and hydrostatic reduction, observing the precautions set forth by Ravitch. Should a recurrence develop subsequent to a hydrostatic reduction, another attempt by hydrostatic means should be made. If there is a second recurrence, surgical reduction is indicated. Appendectomy should be performed so that adhesions thus formed will obviate further recurrence. Should there be another recurrence, ileocolic resection should be resorted to.

Although the rate of recurrence is higher after hydrostatic reduction than after surgical, the authors believe that with the above regimen needless surgical exploration will be avoided, as well as needless ileocolic resection; yet surgical intervention should not be denied to the child when it is reasonably certain to be advantageous. —*Stephen W. Carveth, M.D.*

Discussion on Squamous Cell Carcinoma of the Anus and Anal Canal. W. B. Gabriel. *Proc. R. Soc. M.*, Lond., 1960, 53: 403.

In 1941, the author reported 55 cases of anal and anal canal carcinoma. He now reports a series of 117 cases, observed from 1941 to 1955, drawn from the records of St. Mark's Hospital, London, England and his own practice. In the earlier report, squamous cell carcinoma of the anal canal was more prevalent in women, whereas in the present series males outnumber females 46 to 41. The incidence and sex distribution of squamous cell carcinoma of the anus have remained unchanged through both reports; in the present series there were 25 men and 5 women. Some predisposing conditions have been suggested to account for the higher incidence of anal carcinoma in men, including pruritus ani, leucoplakia of the anus, papillomas (condylomata acuminata), malignant change in chronic fistulas, and squamous cell replacement in prolapsing hemorrhoids. However, although some of these conditions are more common in men, this does not fully explain the sex distribution.

A typical, localized squamous cell carcinoma of the anus is best excised locally without biopsy. More diffuse lesions must be examined carefully to distinguish carcinoma of the anus from that of the anal canal, or a downward extension of a rectal carcinoma. Other lesions, such as primary chancre, must be kept in mind. Dark field examination and blood tests will establish this diagnosis. Tuberculous ulcerations can usually be accurately identified by appropriate tests. Carcinoma of the anal canal is more dangerous than carcinoma of the anus. The degree of differentiation of the tumor seems to be of greater surgical importance than are slight differences in the histologic appearance of the lesion which depend upon the level of origin. In this series, 66 of the 87 carcinomas of the anal canal were anaplastic, and 19 of the anaplastic group were inoperable. Of the 30 carcinomas of the anus, 10 were anaplastic but only 1 anaplastic cancer was inoperable

Carcinoma of the anal canal was formerly treated by colostomy and perineal excision. Since 1946, however, radical combined excision, synchronous or perineoabdominal, has been chiefly employed. Crude 5 year survival rates were 73 per cent (11 of 15 cases) for differentiated anal canal carcinomas, and 44 per cent (18 of 41 cases) for anaplastic cancers. In the treatment of carcinoma of the anus, others have had good results with interstitial radium needles. However, the author prefers local excision by cutting diathermy. Of 28 cases of anal carcinoma, there has been a 5 year survival rate of 60 per cent. Routine inguinal dissection is not recommended for cancer of the anus or anal canal. However, if there is suspicion of inguinal metastases, radical block dissection should be performed, rather than mere biopsy of a single inguinal node. The author stresses careful long term follow-up, and a case history is presented in which an inguinal metastasis was found and successfully removed 13 years after perineal excision of an anal canal carcinoma. Roentgenotherapy is not considered as effective as surgical intervention for cancer of the anal region, and those patients operated upon after roentgenotherapy have fared poorly. Case histories are included, however, which illustrate long term survival of 2 patients with surgically inoperable anal canal carcinomas who received million volt roentgenotherapy. —*Emile L. Meine, Jr., M.D.*

LIVER, BILIARY SYSTEM, AND PANCREAS

Right Hemihepatectomy for Primary Hepatoma. A. Otaki, A. E. Read, J. Stubbs, and H. Sculthorpe. *Brit. M. J.*, 1960, 2: 256.

The diagnostic, surgical, and biochemical features of a case of primary hepatoma treated by right hemihepatectomy are presented.

The diagnosis of primary hepatoma was established in a 13 year old girl by means of a portal splenogram. The splenogram revealed absence of vessels on the right side of the liver with medial displacement of neighboring radicles. Needle biopsy yielded a tissue diagnosis of anaplastic tumor suggestive of a primary hepatoma. She subsequently underwent right hemihepatectomy and was vastly improved at the time of her 6 month reassessment.

Preoperative laboratory studies are presented and discussed. The most significant finding was an elevation in the alpha$_2$ and beta globulin fractions in the

serum electrophoretic pattern. The authors note that this finding had been present in 6 other of their patients with primary hepatic neoplasms.

The biochemical changes after removal of the right lobe of the liver are also presented. The noticeable features were a marked rise in the serum alkaline phosphatase and transaminases accompanied by a slow rise in the serum cholesterol and its esterified fraction. —*C. Thomas Fitts, M.D.*

Peroperative Cholangiography and the Problems of Visualization and Treatment of Stones and Strictures in the Biliary Tract. HERMAN DØHLEN. *Acta chir. scand.*, 1960, Suppl. 253, p. 99.

FOUR EXPOSURES are made after injection of 3, 10, and 15 c.c. of contrast medium, with the last exposure made 5 minutes after the last injection. In the entire series there have been no serious complications. There was 1 perforation of the duct which, however, caused no untoward symptoms.

In 206 cases, 185 cholangiographies were performed. Cholangiography made choledochotomy unnecessary in 22. Unsuspected stones were found in 9 patients. Thirty per cent of the patients had stones in the duct. Ninety per cent of the patients remained free of biliary symptoms and in only 1 did the roentgenographic study fail to show the ductal disease.

—*Harold M. Unger, M.D.*

An Approach to Biliary Tract Operations. H. C. DAHLEEN, C. A. SHORT, JR., and V. F. DALSEM, JR. *California M.*, 1960, 93: 102.

THE AUTHORS have proposed certain innovations in the standard operative exposure of the contents of the right upper quadrant of the abdomen, in particular, the biliary tract. These changes have to do with the positioning of the patient and the position of the surgeon as well as the incision employed. The technique is suggested as an alternate to the paramedian or subcostal incision, long used as the standard for exposure of the extrahepatic biliary tract; when properly employed little or no assistance is required.

The patient is rolled to the left side and the shoulders and back are supported with a folded pillow at an angle of approximately 20 degrees with the horizontal. The table is "broken" in the middle so that the right flank musculature is put on the stretch. The table is then placed in 10 degrees of reverse Trendelenburg position so that gravity will retract the abdominal viscera toward the patient's left side and inferiorly. The right arm is attached to the anesthetist's screen, which also adds exposure to the incision. The surgeon stands on the left side of the table and employs the Kehr incision to enter the abdomen. The horizontal arm of the incision is made first from a point just lateral to the lateral border of the right rectus sheath at the level of the tip of the tenth rib and is brought medially to the midline. If after exploration the procedure is to continue, the second limb of the incision is made in the linea alba of the upper abdomen to the xiphoid process. The flap thus constructed is weighted with a vaginal retractor and drawn to one side, giving a considerable amount of intra-abdominal exposure.

The incision has been used by the authors over a period of 10 years. They have employed it largely for biliary tract operations, although it has been used for pancreaticoduodenectomy and, by transposing it to the left side, for splenectomy.

—*Harvey N. Lippman, M.D.*

Biliobiliary Fistulas (Las fistulas bilio-biliares). CARLOS VELASCO SUÁREZ. *Bol. Soc. cir. B. Aires*, 1960, 44: 288.

BESIDES the well known internal biliary fistulas, abnormal communications occur between the biliary tree and the surrounding organs as a complication of inflammatory and calculous diseases. The author presents several cases of his own experience with fistulas formed between the gallbladder or cystic duct and some other portion of the extrahepatic biliary system, namely, the hepatic or common ducts.

A long cystic duct that transversally crosses the common duct may have a stone inside its lumen and, if the end orifice of the cystic duct is a narrow one, the stone may protrude into the common duct due to pressure and inflammatory reaction and, in an advanced stage, produce necrosis of both cystic and common duct walls, causing abnormal communication between both ducts and the passage of stones to the main biliary duct.

Among more than 3,000 operations on the gallbladder or biliary ducts, the author has found this complication in only 14 cases.

—*Jaime Bárcena, M.D.*

Depression of Pancreatic Exocrine Secretion with a Carbonic Anhydrase Inhibitor. MARION C. ANDERSON, JAMES M. MUELLER, and DAYLE O. SNYDER. *Am. J. Digest. Dis.*, 1960, 5: 714.

ON THE BASIS of previous reports that diamox, a carbonic anhydrase inhibitor, reduced the volume and bicarbonate ion concentration of pancreatic exocrine secretion, the authors studied the effect of this substance on 10 patients. Two of the patients had pure pancreatic fistulas. In these instances diamox appeared to cause a significant reduction in secretion. Further depression in secretion was observed when atropine was added to the regimen.

Eight patients with acute or chronic pancreatitis were observed to experience symptomatic improvement. Because of the absence of adequate objective methods it was difficult to evaluate the specific effect of diamox in the presence of other therapeutic adjuncts.

The results are considered sufficiently favorable to warrant continued study.—*Harold Laufman, M.D.*

Carcinoma of the Pancreas. E. S. R. HUGHES and GRAYTON BROWN. *Med. J. Australia*, 1960, 2: 7.

THE AUTHORS REVIEW the experience from 1950 to 1954 of 89 cases of pancreatic carcinoma seen at the Royal Melbourne Hospital, Melbourne, Australia. In the same period there were 279 cases of carcinoma of the stomach. Thus they occurred in a relationship of roughly 1 to 3. The distribution of the tumors was the ampulla, 10 cases; the head of the pancreas, 61 cases; the body of the pancreas, 12 cases; and the tail of the pancreas, 6 cases. Carcinoma of the ampulla presents typically with painless jaundice and because of this, surgical treatment is performed earlier. In

this series there were 10 cases of carcinoma of the ampulla. Six patients had a radical resection and 1 of these was alive and well 6 years after operation. One patient who did not undergo resection is alive 2 years after a palliative shortcircuiting procedure. The carcinoma of the head of the pancreas is more common and typically presents with pain and jaundice, although in 13 of the 61 patients in this series jaundice was not noted and in 17 of the group there was no pain. Three patients underwent resection and 1 of these is alive and well 6 years later. Two patients treated with palliative surgical procedures were alive 6 years and 4.75 years after operation.

Carcinoma of the body of the pancreas occurs with about the same frequency as carcinoma of the ampulla. Pain is the prominent symptom and in this group only 2 patients were subjected to radical excision. Both patients had cystadenocarcinomas and neither survived long after operation. One patient had a laparotomy only and was alive and well 5 years later. The tail of the pancreas is least often involved with carcinoma. Here pain and loss of weight are the chief clinical features. No patient in this series underwent resection and none survived longer than 9 months.

—Gordon F. Madding, M.D.

SPLEEN

Laparoscopic Diagnosis of Hemoperitoneum Caused by Traumatic Rupture of the Spleen (Contributo laparoscopico alla diagnosi precoce di emoperitoneo da rottura traumatica di milza). ELIO FIVOLI. *Osp. ital. chir.*, Firenze, 1960, 2: 369.

THE AUTHOR reports on 4 cases of ruptured spleen in which laparoscopy played an important part in the diagnosis. These patients were seen at Pio Institute of the Holy Spirit in Rome, Italy.

Laparoscopy is of aid in cases in which there are repeated small hemorrhages and the clinical picture is not clear cut, the so-called delayed hemorrhage. If the clinical picture shows injury in the left hypochondriac region and the diagnosis of ruptured spleen is considered a possibility, laparoscopy is indicated. If blood is found, immediate laparotomy is indicated. The normal-sized spleen is difficult to visualize and it was not seen in any of the 4 patients observed.

The author believes that laparoscopy is a very important aid in the diagnosis of ruptured spleen, especially in the cases in which the clinical picture is not typical but the possibility of a rupture is suspected.

—Lucian J. Fronduti, M.D.

Overwhelming Infection in Children Following Splenectomy. RUSSELL V. LUCAS, JR., and WILLIAM KRIVIT. *J. Pediat.*, S. Louis, 1960, 57: 185.

THE AUTHORS state that the occurrence of overwhelming infection in infants and children after splenectomy has been well documented. Because the underlying disease necessitating splenectomy has often seriously compromised resistance to infection, it has been impossible to assess the clinical importance of this infection. After the performance of splenectomy for such conditions as Aldrich's syndrome, reticuloendotheliosis, neutropenia, and aplastic anemia must be evaluated in the light of the known high incidence of infection occurring prior to splenectomy.

The authors analyzed the records of those children aged 16 or less who underwent splenectomy from 1942 through July, 1957. The survey revealed 78 patients who had undergone splenectomy for spherocytic hemolytic anemia, idiopathic thrombocytopenic purpura, or traumatic rupture of the spleen. Current follow-up was obtained in 74. The shortest duration of follow-up was 2.5 years.

Twenty-six patients with spherocytic hemolytic anemia underwent splenectomy. Two patients had subsequent infection and died. Both of these patients were boys, 6 and 7 years of age. One had well documented evidence of pneumococcal sepsis and the other had circumstantial evidence of overwhelming infection.

Thirty patients with thromobocytopenic purpura were reviewed. One patient in this group had subsequent infection and died. He was an infant with thrombocytopenia and a giant hemangioma who underwent splenectomy at 3 months of age and died at 7 months of age from a sudden overwhelming infection.

There were 18 patients with traumatic rupture of the spleen. No infections were noted in this group of patients.

It appears from the authors' data that there is a slight, but real, increased susceptibility to infection in patients who have undergone splenectomy. Though not borne out in their patients, the presumed greater vulnerability of young infants to infection would make one more conservative in the treatment of patients in the first year of life. In the older child the established indications for splenectomy are not vetoed by the slight risk of overwhelming infection. The child who has undergone a splenectomy should, however, be carefully followed up, and all infections should be vigorously treated at their onset.

—Robert Turell, M.D.

SURGERY OF THE FEMALE REPRODUCTIVE SYSTEM

UTERUS AND ADNEXA

Endometrial Biopsies in the Office. E. Seymour Burge and Buel Morley. *Am. J. Obst.*, 1960, 80: 325.

Four hundred consecutive endometrial biopsies with the Randall type cannula curette were performed in the office on 371 private patients. The technique of procedure is described.

There were only 5 cases of insufficient tissue for satisfactory diagnosis. Eighty-three patients were followed up with surgical curettement in the hospital because of further irregular bleeding, endometrial hyperplasia, and atypical histologic changes. Of 11 cases of endometrial carcinoma 9 were diagnosed from the original cannula curettings. There were 10 endometrial polyps in the group followed up by curettage, only 2 of which were suspected from the biopsy material. In 4 cases small placental polyps were found 11 to 15 weeks postpartum; in 5 other cases there were old placental elements many weeks after unsuspected early spontaneous abortion. There was no apparent infection, increased bleeding, or suspicion of uterine perforation in the series.

Endometrial biopsy in the office is a safe, simple, timesaving and very economical procedure in a large majority of patients. Accuracy of diagnosis is high. The authors believe that any instrumentation of the uterus in cases of known or suspected complications of pregnancy should be done in the hospital. Neither should endometrial biopsy be carried out in the presence of infection. Heavy bleeding can usually best be terminated by hospital curettage. Endometrial polyps are frequently missed and are best removed by a hospital procedure. Any lack of correlation between symptoms, physical examination, and histologic findings of endometrial biopsy must be further investigated.

—*Lawrence I. Bernard, M.D.*

Occult Invasive Squamous Carcinoma of the Cervix. H. K. Fidler and J. R. Boyd. *Cancer*, 1960, 13: 764.

The term "occult" carcinoma of the cervix is applied to a group of small and clinically concealed invasive cancers. Twenty such cases of squamous cell carcinoma, discovered mainly by cone biopsy, have been studied. These were not early, but small late cancers.

From these small lesions, the commoner sites of origin of invasive carcinoma can be determined. The invasive lesion occurred in the canal alone in 9 cases, in the canal and at the squamocolumnar junction in 9. In only 2 cases was the site of invasion from the portio. Early invasion frequently commences in a part of the cervix that is not easily visualized for biopsy. In comparison, the extent of the intraepithelial carcinoma was much wider in most instances. All of the lesions except 2 involved the squamocolumnar junction, 3 were confined to it, 15 extended proximally into the cervical canal, and 6 extended onto the portio.

It is interesting to note that the average age of these patients, 51.0 years, is just 1.4 years younger than the average for all invasive cancers in the authors' laboratory. This fact, together with the relatively short duration of symptoms, averaging 4 months, suggests that these small cancers are growing rapidly and might very soon give rise to more obvious signs. Whereas of the authors' patients with purely intraepithelial carcinoma, only one-third had symptoms at all suggestive of cancer, in these cases more than half had such symptoms.

In most of these patients a considerable amount of intraepithelial carcinoma was present. It would almost seem that in the average case a critical mass of abnormal cells must be present before autonomy is achieved. However, in several cases, it would appear that invasion had begun extremely early and very little preinvasive cancer was present beforehand. Two cases, in which there were large lesions, also showed relatively little preinvasive cancer. These seemed to follow the pattern described by Schiller in which the amount of preinvasive cancer present is inversely proportional to the amount of invasive cancer.

These studies provide further evidence that the natural history of carcinoma of the cervix is through several progressive stages. It would appear likely that intraephithelial carcinoma, usually of significantly wide extent and long duration, commonly precedes invasive carcinoma. Discrete microinvasive foci, representing only tentative probings beyond the basement membrane, probably precede frankly confluent invasive carcinoma by several years. The progression of these stages is suggested by the spatial relationships of these lesions as depicted diagrammatically from reconstructions of the cone biopsies and/or hysterectomy specimens.

—*John R. Wolff, M.D.*

EXTERNAL GENITALIA

The Multiple Local Treatment of Human Genital Trichomoniasis. Joseph M. Bedoya. *Gynaecologia*, Basel, 1960, 149, Suppl., p. 148.

When a female is infected with Trichomonas vaginalis, organisms are always present in the urethra as well as in the vagina. For practical purposes, it must be assumed that the partner of the infected female is always also infected with trichomonads and that they are present in the urethra.

Systemic treatment with drugs claimed to be orally active is not effective. It is not a question of finding a drug that is more active against trichomonads but of finding one that can reach all the organisms, wherever they are. The multiple local treatment consists in topical application of an active antitrichomonad agent at all three sites.

The author introduces stovarsol into the vagina and urethra of the female and the urethra of the partner twice daily for 1 week. Trichomoniasis is considered cured when the organisms cannot be found in the vagina 2 months after treatment. In a series of 44 cases an 84 per cent cure rate was obtained.

The obvious disadvantages of the author's method are the following: (1) The patient must attend the clinic twice daily for 1 week, and not all patients can afford or will accept this; (2) patients cannot treat themselves; and (3) introduction of the urethral medication in both the male and the female patient is somewhat uncomfortable.

—*Thomas W. McElin, M.D.*

Treatment of Trichomoniasis in the Female. L. G. Feo. *Gynaecologia*, Basel, 1960, 149, Suppl., p. 101.

The author presents a scholarly review of the current laboratory and clinical concepts of the proper management of Trichomonas vaginalis vaginitis. He outlines in considerable detail his own office management of this problem. Strict criteria are submitted for determination of cure.

A major discussion of the oral method of treating trichomonas infection is presented and the author concludes that there is no positive evidence of direct contact in the vagina between the flagellate and the therapeutic agent. Two drugs were examined, thiosulfil and antipyrine. The amount of these drugs in the vagina was not high enough to have a therapeutic effect. Nevertheless, the trichomonal infection with its inflammatory reaction may produce additional tissue fluid which contains some additional therapeutic agent. A medicament was given by mouth a few days before the onset of the menstrual period with the idea that the flow would then contain enough of the therapeutic agent. In all cases in which oral medication is given, it is important to examine the vaginal fluid to determine the concentration of the medicament.

—*Thomas W. McElin, M.D.*

Adequate Anterior Colporrhaphy. Max H. Parrott. *Am. J. Obst.*, 1960, 80: 381.

A new surgical technique for anterior colporrhaphy is presented along with a review of 67 cases. There is a corrected failure rate of 1.5 per cent on the basis of a 2 year follow-up.

For an anterior colporrhaphy to be adequate, it must accomplish the following: give a well-supported anterior vaginal wall and correct both actual and potential stress incontinence by re-establishment of the posterior vesicourethral angle and mobilization of the urethra and bladder neck without foreshortening of the former.

The anterior vaginal wall has been neglected, in the author's opinion, with regard to the initial repair during vaginal plastic procedures. The anatomy of the area has not been properly emphasized as it relates to an adequate anterior colporrhaphy. The role of the pubococcygeal and puborectalis portions of the levator ani muscles has been largely ignored.

The presurgical assessment must include accurate evaluation of the cause of any associated urinary incontinence.

If a relaxed pelvic floor is symptomatic and a repair is indicated, the suggested technique should be performed even though stress incontinence is not evident. The normal anatomic relationships of the bladder and urethra should be re-established in order to reduce the hazard of future stress incontinence.

—*John R. Wolff, M.D.*

Urinary Infection After Colporrhaphy. M. Lindsay Paterson, Wallace Barr, and Sheila MacDonald. *J. Obst. Gyn. Brit. Empire*, 1960, 67: 394.

The incidence of urinary infection after colporrhaphy was found to be 92.5 per cent in patients in whom an indwelling catheter was used postoperatively and had been in place 48 hours with opening at 4 hour intervals.

With intermittent catheterization this incidence was reduced to 70 per cent.

The instillation of a sterile solution, 1 to 5,000, of chlorhexidine diacetate after catheterization reduced the incidence of urinary infection to 13.5 per cent. It is suggested that this technique be used after every catheterization of the female bladder.

The theory that residual urine is the cause of postoperative infection is thought to be erroneous. It appears that introduction of organisms occurs.

—*Alan Rubin, M.D.*

Le Fort's Operation. C. Keith Vartan. *J. Obst. Gyn. Brit. Empire*, 1960, 67: 470.

The author reports 21 Le Fort operations performed in the last 10 years. The author discusses this operation at this time because he does not agree with the concept that it should be discarded. He states that the operation will cure procidentia, however gross, and that it is the shortest, simplest, and therefore safest method of achieving this objective. By this operation, the aged are spared the inconvenience and unpleasantness of wearing a pessary. The primary modification from the original Le Fort procedure which the author utilizes is that the strips of removed vaginal epithelium are wedge shaped and not rectangular. He believes that this is an important modification. He reminds, as have others, that one must be careful lest the drag of the posterior vaginal wall pull the urethra open and produce stress incontinence.

—*Thomas W. McElin, M.D.*

Extended Use of the Le Fort Operation for Vaginal Prolapse in the Elderly. Eileen M. Whapham. *J. Obst. Gyn. Brit. Empire*, 1960, 67: 473.

The author reviews 295 cases of the Le Fort operation in her own practice in a 6 year period. This almost unbelievably high number of instances of prolapse treated by this method is explained partially by the area in which the author works. She states that there are a large number of women in her district who have settled there by virtue of retirement. All patients over the age of 65 years in whom marital life has been discontinued were considered suitable for the Le Fort operation. A careful description of the operative technique is given and illustrated with suitable line drawings.

A malignant uterine lesion has only once been detected after performance of this procedure. It was found possible to perform a diagnostic curettage for the postmenopausal bleeding via one of the lateral vaginal passages. A total hysterectomy was subsequently performed and the patient survives 6 years after hysterectomy. Only 8 recurrences have appeared in the author's series. The author believes that recurrences have resulted from a failure to make each of the two new vaginas sufficiently narrow so that the

cervix prolapsed again on one side of the septum. In 2 cases ventrofixation was performed with success; in 2 cases the Le Fort operation was repeated with success; in 1 case a vaginal hysterectomy was performed, and in 1, a colpoperineorrhaphy. The remaining 2 patients were fitted with cup and stem pessaries as they were loath to undergo further operative treatment. —*Thomas W. McElin, M.D.*

PREGNANCY AND COMPLICATIONS

The Human Placenta. M. A. Rizk. *Alexandria M. J.*, 1960, 6: 442.

An analysis of 1,000 premature and full term placentas is presented.

The commonest weight of the placenta was 500 gm., noted in 208 cases or 20.8 per cent. The lowest weight was 200 gm., noted in 12 cases or 1.2 per cent. The highest weight was 1,300 gm., noted in a single case or 0.1 per cent. The commonest diameter was 15 cm., and it was present in 250 or one-fourth of all the placentas. The smallest diameter was 10 cm. (8 cases) and the largest was 28 cm. (2 cases).

The majority of placentas examined were circular, 88.1 per cent. The oval type was next in frequency, 11.5 per cent. There were 3 cases of placenta bipartita in this series and 1 of placenta succenturiata. Central insertion of the cord was recorded in 625 cases, eccentric insertion in 356, battledore insertion in 13, and velamentous insertion in 6. There were 38 twins in this series. Nineteen had a large placenta with two cords (uniovular) and 19 revealed two placentas (binovular).

Retracted retroplacental clots, denoting old hemorrhage, were present in 44 cases or 4.4 per cent; some caused symptoms, but others were symptomless and the pregnancy proceeded to term without external bleeding or other fetal or maternal complications. In evidence of this, there were only 32 cases of antepartum hemorrhage in the whole group that necessitated medical or surgical interference; this number also included cases of placenta previa.

It was found that 136 cases showed an edge of the membranes of less than 10 cm. Moreover, the rupture in the membranes was at the edge of the placenta in 12 of these cases without any history of antepartum or intrapartum bleeding.

Biopsies were taken from 29 placentas. Five placentas of prematures were examined histologically and only 2 of these showed atrophic chorionic villi with excessive fibrosis of the cord when compared with the duration of pregnancy. Two placentas with calcareous deposits were examined. In 1 there was white infarct and the other placenta was normal with areas of calcification. One placenta from an 11 lb. stillborn fetus delivered of a diabetic mother—the diabetes being diagnosed by means of urine analysis and blood sugar curve—was examined and found to weigh 600 gm. and to be 16 cm. in diameter. Histologically, it was normal. In a case of erythroblastosis fetalis the examined placenta was 1,100 gm. in weight, 24 cm. in diameter, pale yellow in color, and greasy. Histologic examination of serial sections revealed normal structure. Six of the 12 retained placentas were biopsied. In 3 of them the histologic picture was normal; in 2 there was excessive fibrosis and in 1, a fibroma. Four placentas from cases of chronic hydramnios were examined and were found to be normal.

Ten biopsies were taken from the margins of different placentas; 9 of these showed infarcts associated with no complaint. —*John R. Wolff, M.D.*

Pregnancy, Labor, and the Puerperium in Very Young Primiparas (La gravidanza, il parto e il puerperio nelle primipare giovanissime nell'Istituto Ospedaliero di Maternità di Bologna). L. Sbrocca. *Arch. ostet. gin.*, 1960, 65: 290.

The statistical data on 310 very young primiparas observed during more than 20 years at the Maternal Hospital Institute of Bologna, Italy are evaluated. The upper age limit for these young mothers was fixed at 17 years. The 310 patients for this study were selected from 8,697 pregnant women who were received at the institute for delivery from 1 January 1938 to 31 December 1957. Of the 310 primiparas, 5 patients were 13 years old, 22 were 14, 40 were 15, 119 were 16, and 124 were 17 years of age.

In the 310 primiparas, 7.37 per cent of the births were premature, 25 per cent were precocious, and 67.63 per cent were at term; that is, 7.37 per cent of pregnancies were interrupted prematurely and 25 per cent of patients delivered spontaneously before term. Among the latter group was 1 instance of twin pregnancy. Maternal morbidity consisted of 1 case of tuberculosis, 1 of cardiopathy, 12 of nephropathy, 2 of eclampsia, and 1 of cystopyelitis. In 1 of the 2 cases of eclampsia the attack developed during the pregnancy, the mother recovering; in the other, the attack occurred during the immediate puerperium, the mother dying 2 days later. This was the only maternal death.

The perineal lacerations suffered by these young primiparas consisted of 1 in the 14 year old group, 5 in the 15 year old group, 6 in the 16 year old group, and 12 in the 17 year old group. Episiotomy was performed in 1 16 year old primipara and in 2 17 year olds. Medium forceps was applied 5 times and low forceps 7 times, all in the more advanced age groups. Podalic extraction was performed once in a 13 year old and 3 times in 17 year olds. Cesarean section was performed only once, in a 13 year old primipara with a narrow pelvis and a hydrocephalic fetus.

Of these 310 young patients, the puerperium could be considered as completely normal in 292 instances. There were a few brief febrile and subfebrile attacks but no instance of puerperal sepsis. Of the 311 children delivered, 3 were born dead and 7 others died during the first few days after delivery. The cause of the first 3 fetal deaths was given as gestosis, and, of the other 7 deaths, 4 were instances of prematurity and 3 of immaturity.

The author believes that the establishment of the diagnosis of pregnancy in a very young person need not be the cause of overanxiety; these young mothers show an optimum capacity for the labor of childbirth, and the resultant children are well disposed to confront the dangers and trials of the first days of their life. Both mother and child demand only the normal procedures of assistance and prophylaxis and this will, in nearly every instance, result favorably for both.

—*John W. Brennan, M.D.*

LABOR AND COMPLICATIONS

High Amniorrhexis and the Induction of Labor (Amniorexi alta e induzione del travaglio di parto). EUGENIO LENZI. *Riv. ital. gin.*, 1960, 43: 165.

THIS REPORT is based on a study of 72 inductions started by high artificial rupture of the membranes using the Drew Smythe catheter. In this way one eliminates the usual dangers associated with the piercing of the sac at its lower pole. The instrument described is shaped like a metal letter S holding inside an obturator which extends a short distance beyond the tip. The simple technique of introducing the catheter is described so that it reaches above the presenting part. When the amniotic sac was ruptured, labor ensued in about 24 hours or less in almost 77 per cent of the women observed. If the latent period exceeded 12 hours, medical induction with estrogens was resorted to. In order to minimize the dangers, amniorrhexis should not be attempted when the presenting part is too high, nor should the amount of fluid removed be more than 250 to 300 c.c. Another contraindication mentioned is placenta previa.

On the other hand, the main indications are listed as pre-eclamptic toxemias, moderate degrees of cephalopelvic disproportion, fetal postmaturity, and polyhydramnios. High rupture of the membranes has been helpful also in women whose pregnancy was complicated by cardiac conditions, diabetes mellitus, and Rh maternofetal incompatibility, in which cases it is a distinct advantage to find these antibodies ahead of time in the amniotic fluid, so as to better prepare for an eventual exsanguinating transfusion of the infant. Some patients required, in addition, oxytocic infusions by the drop method. If the warnings presented are observed, there will be no cases of prolapsed cord or placental hemorrhage. Furthermore, perinatal mortality will be no higher than in labors of spontaneous onset. Of the total series under study, 46 were multiparas and 26 primiparas.

—Vincent Ippolito, M.D.

NEWBORN

Problems Encountered in the Diagnosis and Treatment of Spontaneous Perforation of the Bowel in the Newborn. KIRK V. CAMMACK, ALBERT J. MACKSOOD, MAX E. DODDS, and HARDIE B. ELLIOTT. *Am. J. Surg.*, 1960, 100: 54.

SPONTANEOUS PERFORATION of the bowel before or shortly after birth presents a characteristic sequence of clinical signs consisting of refusal to eat, vomiting, respiratory distress, cyanosis, and distention. Bowel sounds are absent. In contrast to adult patients, muscle rigidity may be absent. Roentgenographic demonstration of pneumoperitoneum will verify the diagnosis. If pneumoperitoneum cannot be demonstrated in such a clinical picture, repeat films are indicated for the air may not visualize for several hours. Needle aspiration of peritoneal air may give temporary relief of dyspnea, but the specific treatment is prompt surgical closure of the perforation.

In 2 of the 5 cases reported, death occurred without operative intervention. One of these infants had a 1 cm. perforation of the descending colon and the other a 1 cm. perforation of the distal jejunum. In 2 other infants, the site of the perforation could not be found at either operation or autopsy, but spontaneous perforation was still the concluding diagnosis on the basis of the finding of pneumoperitoneum. Presumably some small perforations seal spontaneously. In the 1 patient successfully treated, a 2.5 cm. laceration in the greater curvature of the stomach was surgically closed. The cause of such spontaneous perforations has remained obscure.

—Stanley W. Tuell, M.D.

SURGERY OF THE MALE REPRODUCTIVE SYSTEM

PROSTATE AND SEMINAL VESICLES

Prostatic Cancer—XV, Incurable Cancer After Conservative Prostatic Surgery for Clinically Benign Obstruction. PERRY B. HUDSON, MANUEL TY, JR., and OTTO MICHAEL LILIEN. *Ann. Surg.*, 1960, 152: 308.

IN THIS ARTICLE as in the preceding ones, the authors have carefully presented important statistics of which few urologists are sufficiently aware. The authors are concerned with the cancers found in patients who have been operated upon for benign prostatic hypertrophy. The point is well made that these patients may develop fatal metastatic disease unless further surgical intervention follows. The life expectancy of our older citizens has increased, and it is of definite value to explore the possibility of surgical extirpation of the remainder of the prostate before there is spread of the disease processes.

This study includes 48 patients who had had a previous conservative operation on the prostate for relief of benign obstructive symptoms. In 32 cases, microscopic diagnosis of cancer was made on the excised specimen. In the remaining 16 cases no neoplasm was found by histologic study. Both groups show relatively short survival times.

Surgical open biopsy of the posterior prostate is suggested to obviate "missed" neoplasms or early localized tumors. This area is the usual point of origin of tumors. When this lesion is found in the periurethral tissues extirpated in the usual prostatectomy it may be considered to have outgrown its point of origin. That is why these lesions so rapidly cause symptoms and/or metastases. Survival time with conservative therapy is far short of that indicated by life expectancy tables for individuals of these ages.

At present there are no biochemical or roentgenographic tests for localized prostatic cancer. Surgical biopsy, by the perineal approach, of the posterior prostate has resulted in the finding of a significantly high incidence of unsuspected prostate cancer. The authors believe that the use of this technique in cases of prostatic enlargement which are preoperatively thought to be benign in nature now seems justifiable. They make a small perineal incision, obtain specimens for and frozen section studies, and then decide on either radical (total) prostatectomy or one of the conservative approaches.

Perineal prostatic biopsy might reveal 10 or 15,000 early prostatic cancers in the more than 100,000 prostatectomies performed annually. These 10 to 15,000 might well be curable by total prostatectomy.

—*John R. Herman, M.D.*

Carcinoma of the Prostate Presenting as Disease of the Rectum. J. M. DAVIS. *Brit. J. Urol.*, 1960, 32: 197.

IN A LARGE HOSPITAL, for the treatment of rectal disease, 16 cases of carcinoma of the prostate which presented as disease of the rectum were seen during the period 1938 to 1957. They may be divided into three clinical types, as determined by the physical findings on the rectal examination of these patients.

Type 1—rectal stricture. The stricture is due to diffuse infiltration of the layers of the rectal wall by carcinoma; it is 2 to 3 inches long and is usually situated at the prostate level. Edema of mucosa and induration of the rectal wall prevent adequate palpation of the prostate. The lesion may encircle the rectum completely or partially; the bowel lumen is severely constricted; and, in some instances, a colostomy is necessary. The symptoms are those of subacute rectal obstruction.

Type 2—anterior submucous rectal mass. In this type, the carcinoma erodes through muscular layers of the anterior rectal wall and presents as a projecting mass covered by edematous rectal mucosa. The anterior position of the mass and the surrounding induration mask its prostatic origin.

Type 3—rectal ulcer. This is actually an advanced form of type 2 in which the rectal mucosa has finally given way over a large area to form a gross rectal ulcer. This type is separately classified because it closely resembles a primary anaplastic carcinoma of the rectum that has become fixed anteriorly.

Biopsy is sometimes inconclusive because many tumors are anaplastic, and there is some difficulty in distinguishing between anaplastic prostate and anaplastic rectal carcinoma. In prostatic carcinoma the tumor cells are smaller and some of them have a characteristically clear cytoplasm with small round hyperchromatic nuclei, as well as prominent nucleoli; this may be useful in differentiation. The serum acid phosphatase level may be useful. Evidence of metastatic changes in pelvic and lumbar spine roentgenograms may be of value and, at times, a second biopsy after an adequate dose of estrogen may show the characteristic tumor cell degenerative changes.

Surgical intervention for carcinoma of the prostate involving the rectum is of no value, but palliation is achieved by hormone therapy. The prognosis is poor. Carcinoma of the prostate with rectal involvement represents an advanced stage of a highly invasive form of disease.

—*David Rosenbloom, M.D.*

Results of 104 Prostatectomies in Patients with Coexisting Cardiovascular Disease. (Text in Greek). A. DELIVELIOTIS, A. SAMARAS, and E. SAOUNATSOS. *Helliniki Iatriki*, 1960, 29B: 36.

OF 237 PATIENTS who underwent prostatectomy at a hospital in Athens, Greece during the last 3 years, 104 had various coexisting cardiovascular diseases. One-third of all patients had hypertension, the blood pressure ranging from 160 to 220 mm. Hg systolic and 80 to 120 mm. Hg diastolic. The ages of patients in this series varied from 56 to 94 years, the majority of patients being 65 to 75 years old.

The usual procedure was Millin's retropubic prostatectomy. A few patients underwent prostatectomy after Hryntschak and Freyer's methods and 1 was operated on transurethrally. Seven patients died postoperatively and in only 1 of them was death due to

circulatory failure. Five deaths were due to uremia not related to the cardiovascular system and the seventh to an acute abdominal condition.

It is concluded that the presence of cardiovascular disease does not constitute a contraindication to prostatectomy but that, on the contrary, this operation improves the patient's condition, provided that both preoperative and postoperative management is extremely careful. —*Michael G. Seremetis, M.D.*

PENIS

Interstitial Implantation of Radium Needles in the Treatment of Carcinoma of the Penis. RANES CHAKRAVORTY. *Acta. chir. belg.*, 1960, 59: 107.

BETWEEN 1926 and 1958, 122 patients with carcinoma of the penis were seen at the Jules Bordet Institute in Brussels, Belgium. Of these, 83 had interstitial implantation of radium into the tumor as initial therapy. Twenty-two patients were cured without complications by one application of radium needles. Seven patients were cured but had radiation complications. Thirty-one patients had incomplete local control.

The most common complication was radionecrosis. Urinary infection was also common as a complication. Secondary phimosis occurred, requiring circumcision. Radiation strictures of the meatus requiring multiple instrumental dilatation were also observed in this series.

The prognosis is largely dependent upon metastases to the groin nodes. However, almost 40 per cent of the patients who were dead 10 years from the initial therapy were known to have died free of cancer.

—*David Rosenbloom, M.D.*

SURGERY OF THE GENITOURINARY TRACT

KIDNEYS AND URETERS

Incidence of Urological Anomalies in Association with Major Nonurological Anomalies. CARTER E. CARLTON, JR., and RUSSELL SCOTT, JR. *J. Urol.*, Balt, 1960, 84: 43.

POSTMORTEM RECORDS of 318 patients having congenital anomalies were studied. Analysis of the data revealed that 26 patients or 8.2 per cent had major urologic anomalies. Only 5 of these 26 patients had findings in the history, physical examination, or urinalysis which might have drawn attention to the urologic anomaly and suggested appropriate investigation. These studies suggest the wisdom of including a high degree of suspicion that a urinary tract malformation exists in addition to the primary recognizable congenital anomaly. A complete urologic history, physical examination, urinalysis, and an excretory urographic study will reveal urologic processes that might otherwise go undetected.

—*Robert O. Beadles, M.D.*

Renal Trauma (Contributo allo studio dei traumi renali). L. MIOLA and M. MAZZITELLI. *Rass. internaz. clin. ter.*, 1960, 40: 270.

THE AUTHORS report 22 cases of renal injury encountered in the past 5 years, in which they made use of early urography as an aid in determining indications for operation. Lesions were due to direct or indirect injury or to contraction. The right and left kidneys were equally affected. Most of the injuries were closed injuries and most of them occurred in middle aged males, who are most frequently exposed to trauma.

In determining the indications for operation, attention must be given to possible collateral symptoms and an expectant attitude should be maintained. Roentgenograms should be made as early as possible, urography being preferable when conditions permit. Urography is harmless and can be repeated when indicated.

Most of the patients in this series presented with pain, hematuria, and shock. Hematuria does not necessarily indicate operation. If urography indicates a normal excretory passage with small lacerations susceptible to spontaneous cure, antishock therapy, hemostatics, and antibiotics will yield good results. Immediate operation was required in only 2 of the 22 patients; their case histories are reported. In 4 patients hematuria gradually subsided and disappeared completely in from 8 to 15 days. The urographic changes were of moderate degree. In 14 patients there appeared a discrepancy between the urographic findings and the degree of hematuria. In 4 of these, operation was indicated for persistent hematuria 15 days after injury. In 2 patients renal venous angiography revealed essentially normal findings and operation was dispensed with. It is emphasized that the roentgenologic examination involves no loss of time but yields important information regarding the excretory apparatus and should always be used in cases of this type.

—*Edith Schanche Moore*

A Simple Direct Approach to the Renal Pedicle. MATTHEW MARSHALL, JR., and S. HARRIS JOHNSON III. *J. Urol.*, Balt., 1960, 84: 24.

WHEN A RENAL TUMOR is present the pedicle should be exposed before disturbing the tumor. Regardless of the type of lateral approach used, the mass is approached before the pedicle and there is resultant interference with its exposure. The incision described combines the advantages of approaching the renal pedicle before the tumor and the higher exposure obtained by the lateral flank incision.

The patient is flexed and placed in a 45 degree oblique position. The incision is started medially about 2 cm. above the unbilicus at the lateral border of the rectus or, if the mass is very large, directly above the unbilicus in the midline. The incision is continued cephalad and laterally over the eleventh rib, but does not include the angle of the rib. The muscle and fascia layers are divided until the transversalis fascia is exposed and opened near the tip of the eleventh rib. The remainder of the exposed transversalis fascia is opened after the peritoneum has been stripped from its undersurface, except where it is adherent in the periumbilical region. The peritoneum and pleura, if present, are dissected from the undersurface of the eleventh rib before it is excised. The anterior and posterior rectus sheaths may be divided for greater exposure if necessary. The plane of dissection is directed beneath the peritoneum until the aorta, vena cava, or iliac vessels are identified. The peritoneum is then opened for diagnostic purposes either with a small incision or widely, if it is adherent to the mass. The mobilization of peritoneum is then continued upward until the renal pedicle is identified and the pedicle ligated individually.

The incision has four advantages: an undisturbed intrathoracic space avoids a source of complication; there is adequate exposure of the renal pedicle in the presence of a large tumor; peristalsis is less disturbed when the bowel is protected by the peritoneum; and the incision is relatively simple to make and to close.

—*Robert O. Beadles, M.D.*

The Residual Kidney After Unilateral Nephrectomy (Il rene superstite dopo mononefrectomia). BRUNO FIDA. *Minerva med.* Tor., 1960, 51: 1300.

THIS STUDY was conducted on 86 human subjects, ranging in age from 14 to 69 years. The evaluations of compensatory hypertrophy of the residual organ were made by means of roentgenographic measurements; however, in 63 of these patients functional tests were also performed.

The 47 patients who could be presumed to have normal kidneys at the time of the original nephrectomy were classified as group A, those patients whose residual kidneys could be assumed to have already

undergone a certain degree of hypertrophy and of compensation were classified as group B.

In group A the roentgenographic measurements showed a significant increase in size both transversely and longitudinally of the residual kidney. In the patients of group B the responses were all of the order of those encountered in group A, but were all less pronounced and became significant somewhat later.

—John W. Brennan, M.D.

BLADDER AND URETHRA

Roentgenograms of the Male Urethra During Micturition (Estudio radiográfico de la uretra masculina durante la micción). IGNACIO PURPÓN, MANUEL BALLESTEROS, and JORGE ALEGRE DÁVALOS. *Rev. urol.*, Caracas, 1960, 18: 21.

DESCENDING URETHROCYSTOGRAPHY is a valuable diagnostic procedure for demonstrating pathologic conditions of the male urethra and bladder neck. It is more physiologic than ascending urethrocystography and in many cases even better than endoscopic procedures.

The technique used by the authors consists in injecting the radiopaque material through the urinary meatus and then asking the patient to void. Roentgenograms are taken during the injection (ascending) and voiding (descending).

Several iodide solutions are used, but recently the authors have been testing an aqueous suspension of 25 per cent barium sulfate which is a practical, nonirritating and inexpensive material.

Urethral stenosis, congenital contracture of the bladder neck, benign and malignant prostatic tumors, and prostatitis are some of the conditions prone to be diagnosed with this procedure.

—Jaime Bárcena, M.D.

The Clinical Use of Renacidin in Urinary Calcifications. WILLIAM P. MULVANEY. *J. Urol.*, Balt., 1960, 84: 206.

AS A SOLVENT for urinary calcifications the author has been making use of "renacidin," a sterile mixture of the anhydrides, lactones, and acid salts of a group of multivalent food acids. A 10 per cent solution with a *p*H of 4 appears to be stable indefinitely, according to the author.

Experiences with 45 cases involving renal, ureteral, and vesical calcifications are discussed. Dissolution of calcium, magnesium phosphate, and carbonate concretions is usually successful. Stones of uric acid or oxalates are relatively insoluble.

Thirteen patients with renal calculi were treated. The best result was obtained by passing a No. 6F plastic catheter and a No. 4 or 5F woven catheter simultaneously. One or 2 c.c. per minute of the solution enter through the smaller tube and drain out through the plastic tube. Complications are chiefly mechanical, such as obstruction of the tube due to the large amounts of sandy and gummy debris that are freed. The progress may be checked with spot films. The disintegration of staghorn calculi as a result of irrigation with 5,000 to 7,000 c.c. over several days has been well demonstrated.

Eight patients with ureteral calculi were treated. Results were good in 3 cases. It is difficult to place tubes properly in the ureter and the ureteral calculi are more often made up of oxalate or uric acid than of phosphate or carbonate.

Ten patients with bladder calculi were treated with irrigation and the results were good in 5. Dense, hard, predominantly oxalate stones are insoluble, but giant calculi of mixed composition can be demineralized enough to facilitate use of the lithotrite.

The calculi associated with indwelling catheters are more soluble than those previously discussed. As a prophylactic measure to prevent plugging of the catheter by calcium salts, renacidin in a 5 to 10 per cent concentration may be used. When calcification already exists, a 10 per cent solution may be used as a slow drip. An illustration is presented showing an impressive clearing of a sectioned calcium-plugged catheter after it was immersed in this solvent.

These encouraging results have been accompanied with lack of irritation or toxicity.

—Allan K. Swersie, M.D.

SURGERY OF THE MUSCULOSKELETAL SYSTEM

BONES AND JOINTS

Bone Formation in Laparotomy Scars. ISADORE KATZ and MILTON LEVINE. *Am. J. Roentg.*, 1960, 84: 248.

THIS REPORT presents the case histories and roentgenographic studies of 10 patients in whom bone developed in laparotomy scars.

Heterotopic bone formation in surgical abdominal wounds is usually asymptomatic, although the patient may complain of some tenderness in the wound. Most characteristically, pain is present in the area of the scar when the patient bends forward, but is absent in the erect position. On physical examination a hard, tender, or nontender mass may be palpated. Histologic studies of excised specimens have invariably revealed true bone, usually of the cancellous type. Roentgenographic studies of excised specimens also show typical cancellous bone. The bone has been found at different depths within the anterior abdominal wall. Some has formed in the abdominal incision as early as 3 weeks after operation, whereas in other instances as much as 14 years have elapsed before its detection.

Lack of recognition of the presence of the bone may lead to roentgenologic and clinical misinterpretation of findings. —*Bernard C. Gerber, M.D.*

Deproteinized Animal Bone Graft (Klinische Erfahrungen mit dem eiweissarmen Tierspan). R. MAATZ. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1959, 292: 831.

THE AUTHOR DESCRIBES his experience with utilizing protein free animal bone as an onlay and inlay graft in fractures. The graft was prepared similarly to that in the method described by Losee and Boyne in 1957 in the United States. In no instance was there an allergic reaction to the graft, and microscopic examination demonstrated a creeping substitution of the graft material by the host tissue. The speed of replacement of graft or substitution depended on the form of the graft and its contact surface. The larger the contact surface present, the faster substitution occurred. The better the graft bed was prepared, the faster it was replaced.

The heterogenous bone graft was used in 141 fractures, 132 of which were aseptic operations. In only 4 of the patients, or 3 per cent, did infection develop. In 103 cases, the graft was used as an inlay graft. In only 3 patients did failure develop. In 28 patients it was used as an onlay graft; there were 2 nonunions.

Roentgenograms taken 8 to 12 weeks after operation demonstrated in all cases an increased density of the graft. In the author's opinion, it was due to substitution of the graft by new bone tissue.

In conclusion, the author states that a protein free bone graft cannot replace an autogenous graft in quality but it can be used safely if the latter is not available. Apparently, it functions like a dead frame along which proliferation of the host's osteoblasts occurs and which, after complete absorption, becomes ossified.

A photograph demonstrating the size and shape of the graft used in this series is enclosed as well as roentgenograms demonstrating successful healing of the graft. —*George B. Wichman, M.D.*

Ten Cases of Giant Cell Tumor (Dieci casi di tumori a mieloplassi). ALDO GIUSTI. *Cancro*, Tor., 1960, 13: 65.

TWO OF THESE LESIONS involved the lower end of the radius, 2 involved the metacarpi, and 2 the ilium; 1 lesion involved the navicular bone of the wrist, 1 the greater trochanter, 1 the superior, and 1 the inferior extremity of the tibia. There was a history of trauma in 5 instances and a concomitant disease such as tuberculosis of the spine or Reiter's syndrome in 2 cases.

In every instance pain and local swelling were the first symptoms. In no case was there any evidence of nerve involvement. An attempt was made to classify these lesions into intracortical and intraperiosteal types; however, in this series there was a preponderance of transitional types.

The treatment always consisted of curettement and electrocoagulation of the osteolytic cavity, followed by packing of the cavity with bone chips. Triturated bone was not employed for packing. Irradiation therapy was not used. The reasons given for disfavoring its use are the impossibility of thus obtaining a precise diagnosis unless puncture aspiration is used—a method which the authors have found unsatisfactory; the inability to obtain complete eradication of all the tumor tissue; the danger of the irradiated tumor tissue undergoing a malignant transformation; and, of course, the danger of producing cutaneous irradiation damage with the high dosages required, 4,000 to 7,000 r.

Eight of these patients were apparently cured when dismissed. One patient later had a recurrence, the packed bone chips undergoing resorption. At reoperation a massive tibial graft was inserted; this also underwent resorption, but the patient refused further treatment. Resection of the lower end of the radius was proposed. The tenth patient refused operative therapy. —*John W. Brennan, M.D.*

Sarcoma in Paget's Disease of Bone. HUGH C. BARRY. *Austral. N. Zealand J. Surg.*, 1960, 29: 304.

THERE HAS BEEN wide difference of opinion concerning the incidence of Paget's disease in various areas of the world and also concerning the likelihood that a malignant change will develop from this disease.

To clarify the matter, the author has reviewed all cases of Paget's disease in the files of the four teaching hospitals in Sydney, Australia. He comments that in Sydney osteitis deformans is uncommon among persons less than 40 years old, but that among persons older than 40 years the incidence steadily increases throughout the community. The disease is so widespread among elderly people that accurate assessment of the incidence of malignant transformation is impossible. However, from among all of the cases he studied in the files, he was able to find 29 in which malignant transformation had occurred. He summarizes the

clinical findings in these 29 cases. Eleven females and 18 males with an average age of 64.5 years comprised this series. The humerus or scapula was involved in 9 of the 29 cases. Among these 29 cases sarcomatous transformation developed after definite local trauma in 5 patients. The author has noted, after a fracture through an area of Paget's disease, the development of a widespread rarefied area in roentgenograms, which perhaps suggests that a malignant change may be developing and that the fracture might have occurred before this bony change became obvious roentgenologically.

In this series, when malignant transformation came about, it was typical of true osteogenic sarcoma in most cases, but examples of chondrosarcoma and fibrosarcoma also were noted.

Treatment consisted of amputation in 6 cases, deep roentgen ray therapy in most, and only palliative treatment when the disease was far advanced. Most patients were unaffected by any treatment and died within 6 months. Two patients survived 3 years and 8 months, and 7.5 years, respectively.

—*Einer W. Johnson, M.D.*

Dislocations of the Shoulder Joint (Behandlung und Prognose von Verrenkungen der Schulter). E. FRANK. *Chir. praxis*, 1959, p. 385.

ONE HUNDRED PATIENTS with dislocations of the shoulder (64 men and 36 women) were studied.

A trial with the technique of Arlt was always made. In this technique traction is applied on the arm abducted at 30 degrees with the elbow flexed and the axilla supported over the well-padded back of a chair. In 18 patients, most of whom were elderly, reduction was not obtained and the hippocratic method under general anesthesia was used. Roentgenograms are always taken. The arm is immobilized by a bandage for 4 to 5 days, or 8 to 10 days when there is a bony avulsion. After this period active motions of the shoulder are carried out.

The complete treatment requires 35 days. The average for patients with direct trauma to the shoulder was 62 days. After this period 25 per cent of the patients had normal joint mobility. Only 4 patients, all aged women, had limited motion at the time of the follow-up study. The reposition of the avulsed tuberculum majus was always good. There was no compensation in the 31 occupational accidents.

—*Joseph C. Mulier, M.D.*

Atraumatic Reduction of Dislocations of the Elbow (Schonende Einrichtungsmethode fuer Ellbogenverrenkungen). W. ERBAN. *Chir. praxis*, 1959, p. 401.

SINCE 1955 L. Böhler has used a new method for reduction of elbow dislocations. By the use of continuous traction he avoids the dangers of secondary trauma.

The patient is in supine position and the extensor side of the elbow joint is locally anesthetized. The forearm is suspended in neutral rotation by means of fixation of the thumb, index, and ring finger, and the elbow is flexed at 110 to 130 degrees with the upper arm in abduction.

Downward traction of 8 to 10 pounds is applied to the upper arm and the forearm is pushed in the opposite direction when there is a lateral displacement. Spontaneous reduction occurs usually after a few seconds; the maximal period was 10 minutes.

A plaster cast is then applied with the elbow joint in 90 degree flexion. The cast is removed after 3 weeks. Total recovery of mobility may take as long as 3 months.

In 6 of 32 cases some limitation of motion remained. In 6 cases with avulsion of the medial epicondyle no bony union was obtained.

—*Joseph C. Mulier, M.D.*

Closed Wire Fixation of Supracondylar Fractures in Children (Gedeckte Bohrdrahtosteosynthese kindlicher suprakondylaerer Oberarmbrueche). J. BÖHLER. *Chir. praxis*, 1959, p. 397.

DURING the last 3 years supracondylar fractures with severe displacement were fixed with two Kirschner wires after reduction.

In extension fractures reposition is carried out through traction on the extended elbow, followed by direct pressure to correct lateral displacement and complete flexion to maintain the reduction. While this complete flexion is maintained, 2 pins are introduced through the epicondyles into the opposite cortex. Position is checked on the screen of the image intensifier. Roentgenograms are taken and the wires are cut just underneath the skin.

In the less frequent flexion fractures the fixation is carried out with the elbow in extension. After 24 hours an unpadded cast is applied for 3 weeks. The cast and the wires are removed after 3 weeks. By this method secondary displacement and ischemic complications are avoided and hospitalization is shortened.

Twenty patients were treated by this method without complications or loss of mobility of the elbow.

—*Joseph C. Mulier, M.D.*

Fractures of the Os Multangulum Majus (Die Brueche des Multangulum maius). J. POIGENFÜRST. *Chir. praxis*, 1959, p. 409.

AFTER A DESCRIPTION of the anatomic and radiologic appearance of fractures of the os multangulum majus, 9 different types of fractures are designated.

Of the total of 4,920 patients with fractures and spasms of the wrist treated between 1926 and 1956, 36 had fractures of the os multangulum majus. The cause was direct violence in 22 of the closed fractures and indirect violence in 7. There were 7 open and 29 closed fractures. In 8 cases other bones were fractured as well. There were 31 men and 5 women. The youngest patient was 19 years old.

In treating these fractures one must try to obtain an anatomic reduction to avoid a painful arthrosis. Reduction is accomplished by traction on the thumb in the direction of its length followed by pressure over the displaced bone fragments. It is difficult to maintain the reduction by a cast alone and there may be need for crossed wire fixation.

Weekly roentgenographic checkups are necessary, since the reduction may be lost. The immobilization is continued for 3 weeks in simple fractures and for 6 weeks in fractures with dislocation.

—*Joseph C. Mulier, M.D.*

Luschka's Joint, a Degenerative Phenomenon. CAESAR OROFINO, MARY S. SHERMAN, and DANIEL SCHECHTER. *J. Bone Surg.*, 1960, 42-A: 853.

VARIOUS HISTORICAL CONCEPTS regarding the nature of Luschka's joint are discussed. Some controversy still exists with respect to the exact nature of this condition, and the authors undertook a series of studies in order to clarify the problem.

Anatomic preparations of the cervical spine of a 13 cm. fetus, a 14 cm. fetus, 8 full term fetuses, and 1 elderly adult were carefully studied. Coronal and oblique longitudinal sections of the entire cervical spine were made.

On the basis of this study it appears that no synovial joint exists in the region of the uncinate processes of the cervical vertebrae. The roentgenologic changes which were previously ascribed to degenerative arthritis or protruded intervertebral discs are actually due to reactive osteogenesis or osteophytosis. The new bone formation is a response to the repeated muscular stresses of aging, resulting eventually in collapse of the intervertebral disc. The process is probably hastened by the occurrence of external trauma.

—Orville F. Grimes, M.D.

The Direct Approach to Pott's Disease (L'abord direct des foyers pottiques). R. BOULVIN. *Ann. chir.* Par., 1960, 14: 501.

IN THE CERVICAL REGION the author used a retrosternocleidomastoid approach. In the dorsal region a paravertebral incision was used. Two or more ribs were resected, but for the eighth to twelfth ribs the intercostal nerves are respected. In the dorsolumbar region, twelfth dorsal to first lumbar, a paravertebral incision from the tenth to the twelfth dorsal level is prolonged towards the anterosuperior iliac spine. The eleventh and twelfth ribs are resected and a retroperitoneal route is followed in the abdomen. The lumbar vertebrae are approached through an anterolateral route (lumbar sympathectomy approach) and the lumbosacral region is approached transperitoneally.

The author believes that the intervertebral discs should be removed to a maximum extent to obtain a rapid fusion. Bone grafts have not been used and seem unnecessary. The cavities are always drained. Postoperatively, these drains are rinsed daily with saline and streptomycin is injected. The drains are removed between the thirty-fifth and the sixtieth days. Complete bedrest in a plaster shell for 3 to 4 months is followed by the wearing of a corset for 3 to 4 months, but medication is stopped at this latter time.

In cases with spastic paraplegia a regular approach was used and only when the lesions were found to be insufficient to explain the paraplegia was anterolateral decompression performed. Ten patients with flaccid paraplegia were operated upon with Seddon's technique; there were 6 complete recoveries, 2 deaths, no change in 1 case, and the condition of 1 patient improved after the seventh day.

There were 13 deaths directly due to operation in the entire series, 4 persisting sinuses, and 2 cases of reactivation of the bone lesions.

—Joseph C. Mulier, M.D.

Fractures of the Hip, a Method for More Positive Stabilization. BEN F. PERRY. *Am. Surgeon*, 1960, 26: 313.

THE AUTHOR EMPHASIZES the importance of overreduction of fractures of the hip and of producing an abducted or valgus position of the femoral head in relation to the long axis of the femoral neck. He believes that by converting each intertrochanteric or cervical fracture of the hip into the abducted or valgus position greater stabilization of the fracture is obtained and that migration of the nail and alteration in the position of the fracture as healing progresses are thus prevented or markedly reduced. This article is a preliminary report of 15 cases in which the author used this system of management.

He uses a modified Jewett nail which is angled at 140 degrees and triflanged only in the distal 1.25 inches of the nail. This nail plate is driven up the femoral neck at an angle of 135 degrees with the shaft, and then, by a clamp which the author has perfected, he is able to pull the shank of the nail flat against the lateral cortex of the femur, thus producing valgus position of the fracture. The plate is then screwed to the shaft, assuring adequate fixation of the fracture.

In the 15 cases discussed by the author the patients were between 65 and 99 years old, and in only 1 instance was there a mechanical or surgical complication which caused inward migration of the nail. Seven of these 15 fractures occurred in the femoral neck; 8 were in the trochanteric area.

The author presents no account of his end results.

—Einer W. Johnson, M.D.

A Review of 48 Cup and 65 Acrylic Hip Arthroplasties. L. E. LAURENT and A. SIVULA. *Ann. chir. gyn. fenn.*, 1960, 49: 84.

A SERIES of 48 cup-plasties and 65 acrylic-plasties with Judet's original prosthesis during the period of 1949 to 1958 was studied by the authors. The average time of observation for the cup-plasties was 7 years and for Judet-plasties 4 years. In cup-plasties, Smith-Peterson's vitallium cup was used. A modified Smith-Peterson incision was made in 48 cases and Ollier-Lexer's curved incision in 65 cases. The greater trochanter was, as a rule, sawn off, and refastened to the diaphysis by means of either a screw or a metal wire. The joint capsule was usually removed.

There was wound infection in 9 cases of cup-plasty and 4 cases of Judet-plasty. Because of infection, 5 cups and 1 Judet prosthesis had to be removed within 3 months of the operation.

After the cup-plasty had been carried out, treatment consisted of a pelvic plaster cast for 2 to 3 weeks and then traction. After acrylic-plasties, traction by means of a Kirschner wire through the tibial tuberosity was maintained for 3 weeks. Physiotherapy was then begun, and the patients were allowed to stand on the affected leg after 8 weeks. The average time of treatment was 10 weeks.

The cup-plasties gave better results than the Judet-plasties so far as pain was concerned, whereas, with regard to mobility, the result was the reverse. An improved walking capacity was achieved in only one-third of patients.

On account of various complications or persistent pain, reoperation and supplementary surgical procedures were carried out in 35 cases.

A total of 16 prostheses had to be removed, 8 being cups and 8 the Judet prosthesis. Wound infections developed in 6 of the 16 patients, and in 6 others, pain and stiffness necessitated the removal. A Whitman reconstruction was utilized in 8 of these patients, the results being generally unsatisfactory, although the result in 1 was excellent. Arthrodesis was performed in 6 cases. In the cup-plasties, dislocation occurred twice and after the Judet-plasty 7 times in the 113 operations performed.

Fifty per cent of the patients with cup-plasty had beneficial results which appear to be permanent. After Judet-plasty with the original prosthesis, the results deteriorated with time, since there was resorption of the collum leading to loosening of the prosthesis.

—*C. Fred Goeringer, M.D.*

The Trochanteric Reconstruction Operation for Ununited Fractures of the Upper End of the Femur. PAUL C. COLONNA. *J. Bone Surg.*, 1960, 42-B: 5.

THE AUTHOR presented this address at a meeting of the British Orthopedic Association in April 1959. In it he discussed the trochanteric reconstruction operation and assessed its merits and contraindications. He adds a few words on some important aspects of postoperative care of patients undergoing this procedure. The technical details of the operation are given in the original article.

The first such operation of trochanteric reconstruction was performed in 1931 for nonunion of the neck of the femur. Many such procedures have been performed since that time, with satisfactory results in about 85 per cent of cases.

It is suggested that the operation is of value not only for cases of nonunion of the femoral neck, but also may be used to advantage in patients in whom either a stem prosthesis or an intramedullary prosthesis has failed to give a successful result.

The author believes that degenerative arthritis is not an indication for this procedure since the cartilaginous destruction of the acetabular roof militates against free and painless movement of the joint after operation. In addition, the operation is not recommended for patients who have a shallow or a wandering type of acetabulum, as in congenital hip dysplasia, or for patients who present evidence of erosion of the acetabulum by disease or pin protrusion.

All of the patients operated upon and discussed by the author in this lecture had shortening, pain, and instability before the operation. The objective of the procedure has been to lessen or completely abolish pain, to produce a stable secure hip, and to lengthen a shortened limb. Shortening of the leg is particularly evident when the trochanter has ridden above its normal position. For these patients, traction for a week or so before operation has been found to be helpful.

The author stresses that not only must the clinical signs and symptoms be carefully judged in an individual case before operation, but also that much information about the suitability of the procedure can be obtained by careful study of the preoperative roentgenograms. In this respect, the following questions are important in the preoperative assessment of patients undergoing these procedures: (1) Is the femoral head necrotic; (2) has the head been severely damaged by trauma or previous operation so that its salvage is not possible; and (3) is the joint space normal, indicating a good covering of cartilage in the acetabulum, and is the acetabulum of normal depth?

—*Orville F. Grimes, M.D.*

Arthroplasty of the Knee. L. G. P. SHIERS. *J. Bone Surg.*, 1960, 42-B: 31.

THE NEW PROSTHESIS introduced by the author is designed to restore function and abolish intractable pain of the knee. Establishment of knee motion is mandatory, particularly when the opposite knee is similarly affected. Fashioned after a door hinge the prosthesis is made from molybdenum-bearing stainless steel. It consists of two stout modified intramedullary pins with a substantial hinge between them. When properly applied it enables one to flex and to extend his knee appreciably well, with a minimal amount of pain.

Twenty-eight hinge operations have been performed on 17 patients. In 12 of the 17 patients the functional results achieved are assessed as good. In 1 an osseous ankylosis ensued. Some of the patients underwent additional revision of the primary arthroplasty before final evaluation was completed. Postoperative complications were: mechanical failure of the prosthesis, breaking of the prosthesis, sepsis in 1 case, and malposition of the tibial stem of the hinge in another patient.

With the advent of recent modifications and improved technique this prosthesis has provided greater structural stability for poorly functioning knee joints. General acceptance of this ingenious form of knee arthroplasty will be based upon long range observation and the permanent results achieved.

—*Samuel L. Governale, M.D.*

Intramedullary Nailing of the Knee Joint with Reversal "Sliding Grafts" (Marknagelarthrodese des Kniegelenkes mit Umkipp-Plastik). JÖRG BÖHLER. *Chir. praxis*, 1959, p. 427.

RESECTION of the femoral or tibial condyles at the knee joint may be necessary in extensive benign tumors invading the articular surfaces or in potentially malignant tumors such as giant cell tumors with histologic signs of malignancy and also in slowly growing chondrosarcomas or fibrosarcomas. Malignant tumors, osteosarcomas, in which the prognosis after amputation is the same as that after local resection are also suitable for this operation.

After resection of the diseased portion, the shaft of the other bone is split in a sagittal direction. The condyles are fixed together with a screw. The remaining defects are filled with refrigerated grafts of cortical bone. Further fixation is accomplished by means of circumferential wires. An immediate stabilization is obtained by a 70 cm. Küntscher arthrodesing nail, obviating the need for longstanding plaster immobilization.

In patients with extensive tumors with a good joint surface the same sliding technique may be used with-

out reversing the fragments and with temporary immobilization of the joint by an arthrodesis nail and filling of the defects with autogenous or homogenous refrigerated bone.

One case history is given of each of the three techniques described. —*Joseph C. Mulier, M.D.*

Operative Treatment of Painful and Severe Arthroses of the Knee Joints (Die operative Behandlung der schweren schmerzhaften Arthrose des Kniegelenkes). FR. LOEFFLER. *Zbl. Chir.*, Leipzig, 1960, 85: 1020.

SEVERE DEFORMING ARTHRITIS of the hip and the knee joint has become much more frequent as the population of old people increases. The predominant complaint is pain and the patience of both the doctor and the patient is tried severely in most of these cases. The value of drugs is limited. Correction of posture and gait by supports has also its limitations.

Denervation of the knee joint is impossible, and the extirpation of cancellous bone close to the articulating surfaces, as recommended by Vogel, is as a rule unsuccessful around the knee joint. Arthroplasty and synovectomy do not give satisfactory results in the aged. The author used a resection of the medial portion of the synovial capsule and medial collateral ligament which are removed en bloc through a transverse medial incision over the medial aspect of the knee joint. There are some reports that resection of the medial collateral ligament caused instability in the knee joint, but this complication was not observed by the author. The operation was performed on 80 knees with most satisfactory results.

—*George I. Reiss, M.D.*

The Treatment of Closed Fractures of the Diaphysis of the Tibia and Fibula (Text in Greek). E. STULZ, I. KEMPF, S. TSOUKAS, and G. GEORGALAS. *Nosokomeiaka chron.*, 1960, 22: 331.

THREE METHODS of treatment of diaphysial closed fractures of the tibia and fibula are used at the Traumatology Center in Strasbourg, Germany. These are (1) closed reduction and a cast, (2) continuous skeletal traction with a Kirschner wire placed through the os calcis, and (3) reduction with the help of Böhler's frame. Open reduction and placement of screws is used only if the conservative treatment fails. The immobilization of the extremity after closed or open reduction is maintained with a thigh-to-toes cast of plaster for 10 to 12 weeks.

The authors report 362 cases observed from 1 January 1953 through 31 December 1958. The majority were spiral fractures, 209 cases; followed by transverse fractures, 48 cases; oblique fractures, 47 cases; comminuted fractures, 43 cases; bipolar fractures, 4 cases; and fractures of the tibia alone, 11 cases. The great majority of these fractures were treated conservatively, 331 cases or 92 per cent, while primary operative treatment was undertaken in the remaining 31 cases or 8 per cent. Complications of the conservative treatment included secondary displacement of the fragments, 19 cases; delayed union, that is, no union after 150 days of immobilization, 13 cases; pseudarthroses, 3 cases; and other miscellaneous complications such as infections and vascular complications, 8 cases. The total rate of complications was 11.9 per cent. Delay of union after 100 days of immobilization and up to 150 days was also considered a relative complication and there were 107 such cases. The over-all results were very good in 215 cases, good in 116, poor in 22, and there were 4 deaths.

—*Michael G. Seremetis, M.D.*

Technique of Digital Arthroplasty and Arthrodesis of Hammer Toes (Note technique sur l'arthroplastie des doigts et l'arthrodèse des orteils en marteau). J. LORTHIOIR, JR. *Ann. chir. plast.*, Par., 1960, 5: 115.

A STIFF INTERPHALANGEAL or metacarpophalangeal joint is one of the most common complications of hand injuries. It is the consequence of a direct insult to the joint, whether it is produced by fracture, dislocation, infection, or tendon laceration. The treatment must vary depending on the severity of the ankylosis. Some patients will be relieved by capsulotomy, others will need arthroplasty. Arthroplasty will be required in cases of injury in which adherence of tendons ensues. The joint is approached through a lateral incision, the head of the proximal bone is molded, and a full thickness skin fragment is interposed. When this technique was applied, the best results were obtained in the treatment of the metacarpocarpal articulation of the thumb. On the other digits results were satisfactory as long as the tendons were intact. The technique of arthrodesis for hammer toes is illustrated.

—*Karel B. Absolon, M.D.*

MUSCLES AND TENDONS

Flexor Tendon Ruptures in the Forearm and Hand. JOSEPH H. BOYES, JAMES N. WILSON, and JAMES W. SMITH. *J. Bone Surg.*, 1960, 42-A: 637.

EIGHTY FLEXOR TENDON RUPTURES examined from 1946 to 1959 have been analyzed to determine the cause. During this same period more than three times as many extensor tendon ruptures were recorded.

The intrinsic strength of tendon was verified by showing experimentally that at least half of the fibers must be divided before tendon rupture can be produced. This finding suggests that when ruptures occur within the tendon the tensile strength has been reduced at least 50 per cent prior to the application of the actual distracting force. This weakening can result from direct injury, indirect injury, or disease.

Sudden hyperextension of the involved finger was considered responsible for rupture in 41 per cent of the involved tendons, whereas in 14 per cent, rupture occurred when the patients were attempting to flex against resistance. These ruptures appeared to be related to the physical state of the muscle. Since the elasticity coefficient of muscle decreases with contraction and shortening, the greater the degree of muscle contraction, the greater will be the danger of rupture as a result of indirect violence.

Ruptures at the tendon insertion accounted for 62.8 per cent of 78 ruptures and ruptures at the musculotendinous junction for 5.1 per cent. Twenty-nine, 87.8 per cent, of the 33 patients having hyperextension injury had their ruptures at the tendon insertion. Twenty-nine, 59.2 per cent, of the 49 ruptures at the tendon insertion were produced by hyperextension forces.

No treatment is frequently the best treatment for ruptures of the profundus and sublimis tendons. However, in some cases a simple surgical procedure such as tenodesis or excision of a portion of the ruptured tendon will be required. It is only when flexor function has been severely compromised or lost that radical surgery is essential.

Flexor tendon ruptures appear most frequently in healthy men between the ages of 30 and 50 years. Ruptures seem unrelated to occupation.

Rupture usually follows a definite episode of either direct or indirect trauma. It is often associated with a snap or pop at the site of separation, but there may be little or no associated pain. Statistically, tendons of the ring and long fingers are the ones most frequently ruptured.

When tendons have been weakened by trauma or disease, rupture may occur within the tendon substance. In these cases, a history of rheumatoid arthritis, tenosynovitis, or wrist fracture is common. It is these pathologic processes that are often responsible for the weakening of the tendon that precedes rupture.

—*Preston J. Burnham, M.D.*

Median Nerve Palsy as a Complication of Acute Pyogenic Infections of the Hand. G. D. Oates. *Brit. M. J.*, 1960, 1: 1618.

Since the carpal tunnel syndrome was first described by Brain, Wright, and Wilkinson in 1947, many cases in which median nerve palsy resulted from compression of the nerve on the flexor aspect of the wrist have been reported. In the usual case the cause of this compression is some chronic condition. Not so well recognized, however, is the occurrence of acute compression of the median nerve arising from severe pyogenic infections about the hand. Two previous cases in which such a cause was present have been reported in the literature; both of the patients were treated successfully by decompressing the median nerve at the wrist. The author reports three additional cases, in each of which there was a rapidly developing cellulitis of the hand which arose from 1 to 6 days after the onset of the acute infectious process. In each of these 3 cases surgical decompression of the median nerve was carried out immediately by severance of the flexor retinaculum at the wrist. Each patient had some degree of residual neurologic weakness or loss of sensation in the involved digit, even after decompression. The follow-up period varied from 1 to 5 years in these 3 cases.

The author believes that interference with function of the median nerve resulted from compression of the nerve by inflammatory exudate in the radial and ulnar bursas deep to the transverse carpal ligament. The author does not think that active involvement of the nerve with the pyogenic process is as likely an explanation for the neurologic changes. On the basis of the experience gained from these 3 patients, he urges that a close watch be kept for signs of interference with function of the median nerve in the presence of all severe, acute infections and particularly those in which a tendon sheath is involved. He believes that the transverse carpal ligament should be severed when this syndrome presents itself and that the ulnar and radial bursas should be opened and drained at the same time.

—*Einer W. Johnson, Jr., M.D.*

SURGERY OF THE VASCULAR SYSTEM

BLOOD VESSELS

Acute Vascular Trauma. RICHARD L. TREIMAN and MAX R. GASPAR. *West. J. Surg.*, 1960, 68: 187.

REVIEWS of extensive experience with civilian vascular injuries are infrequent and the present one deals with a large number of cases.

In a 10 year study period 220 vascular injuries were treated in 90 patients at the Los Angeles, California County Hospital. Eighty-eight of these injuries occurred in the forearm or leg and the functional result of treatment depended upon damage to tendons and nerves rather than upon the arterial injury. These patients therefore were excluded from the study, leaving 132 major vascular injuries in 102 patients, aged 89 to 2 years, including 90 males and 12 females.

Of the 80 major arterial injuries 31 were axillary-brachial in location, 21 were femoral, 8 popliteal, 7 iliac, 6 head and neck, 5 aortic, and 2 visceral. Of the 52 major venous injuries 11 were femoral, 9 vena caval, 8 axillary-brachial, 7 iliac, 3 innominate, and 14 miscellaneous injuries to veins of the head, neck, and viscera. The large number of vena caval injuries, 8 in the inferior cava, varies from other reports.

A total of 52 patients received major injuries from sharp instruments, 32 sustained gunshot wounds, 17 had blunt trauma, and 1 had an avulsion injury. Incomplete laceration was the most frequently seen injury and contusions were infrequent except after blunt trauma. It should be remembered that in gunshot injuries actual damage extends 3 mm. further than the visualized defect.

In this series the most frequently used methods of repair were lateral suture and direct anastamosis. Occasionally ligation alone is necessary, and in these cases ligation and division is practiced in order to prevent distal venospasm. Concomitant venous ligation is unnecessary.

The exploration rate increased during the study period and the ligation rate declined as the repair rate rose. In cases of arterial spasm alone, it was found that the spasm must be relieved or the area resected. Continuity of the vessel alone did not insure an adequate collateral flow.

It is advocated that patients with suspected injury to the vena cava receive prompt surgical exploration.

—John J. Bergan, M.D.

Surgical Therapy of Arterial Hypertension (Klinische Beitraege zur kausal-chirurgischen Therapie des arteriellen Hochdruckes). G. RODECK. *Zbl. Chir.*, 1960, 85: 1281.

AN EXACT DIAGNOSIS and proper perspective are necessary to treat the small number of hypertensive diseases which have causes amenable to surgery. The following precipitating diseases are suitable for therapeutic surgical intervention: aortic coarctation, pheochromocytoma, unilateral renal disease, certain cases of Cushing's disease, and acute glomerulonephritis.

Since the first successful correction of aortic coarctation by Crafoord in 1944, the cause of the accompanying hypertension has occupied a center point of interest. Some investigators have suggested that the increase of peripheral resistance, rather than mechanical obstruction, as held by others, is the cause of hypertension. Scott and his associates advocate the renal theory on the basis of Goldblatt type experiments. Surgical intervention is recommended before the age of 20. Two patients were successfully treated by excision and end to end anastomosis, a dacron graft being used in 1.

The pheochromocytomas are found in the adrenal medulla or in the paravertebral ganglia of the chest and abdomen. Permanent hypertension occurred in 37 patients and paroxysmal hypertension occurred in 14 of a series of 51 pheochromocytomas. Many publications in the last few years have mentioned the typical symptoms of palpitation, pulmonary edema, hyperglycemia, and paroxysmal episodes of hypertension. The only permanent cure is surgical removal, the important thing being localization. A case is presented of a tumor located by retropneumoperitoneum with oxygen and successfully removed. It must be emphasized, however, that an exploratory procedure is not indicated unless definite evidence of an adrenal tumor exists.

During a period of 9 months 139 patients were admitted with unilateral renal disease. Surgical intervention in 12 patients of a total of 36 hypertensive individuals resulted in a significant lowering of the blood pressure. Among the causes were hypernephroma, pyelonephritic kidney, tuberculous kidney, and hydronephrosis. *—Andrew P. Adams, M.D.*

Arteriovenous Fistulas of the Hand (Fistulas arteriovenosas de la mano). E. CASTRO-FARIÑAS and R. RIVERA-LÓPEZ. *Angiologia*, 1960, 12: 200.

CONGENITAL ARTERIOVENOUS FISTULAS involving the hand are considered rare lesions.

Two cases of this kind of fistula are presented in which the main symptoms were soft, painful masses in the hands with redness, local increase of temperature, and edema. Both patients had a soft systolic murmur in the apex of the heart.

Arteriography showed many dilated vessels around the lesion. Surgical treatment was carried out on both patients by excising as many small branches as possible and ligating the arterial communications.

—Jaime Bárcena, M.D.

The Experimental Development of Alloplastic Vascular Prostheses and Their Clinical Use (Ueber die weitere experimentelle Entwicklung alloplastischer Gefaessprothesen und ihren klinischen Einsatz). K. PASCHOLD, O. WOLF, and J. VICK. *Zbl. Chir.*, Leipzig., 1960, 85: 1293.

SINCE 1954, various synthetic materials such as vinyon-N, nylon, ivalon, orlon, dacron, and teflon have been used in vascular prostheses. Perlon, a polycaprolactam, has been used experimentally for 2 years. In

order to prevent kinking the longitudinal elasticity was increased by knitting with rings of formic acid. Abdominal and thoracic implantation was performed without difficulty. Lanon, a polyester fiber and similar to dacron, was developed because of a need for more elasticity. Lanon proved easier to knit, less rigid than perlon, and easier to insert and remove. Technical data are given in chart form comparing the properties of perlon and lanon. Various sizes of the prostheses using lanon have proved to be successful.

Lately, the interest has been in using small branches, 7 mm. in diameter, of a main piece of synthetic material, resection of the replaced segment following only after the bypass has been proved to function. The preparations are examined histologically between 3 and 7 months after transplantation. The new intima of a lanon graft was found to be thinner than that of perlon. Perlon, a polyamide, has the same crusting as nylon, and thromboses easily with small caliber grafts.

Certain fundamental principles must be adhered to in using the synthetic grafts in patients. A valid indication based upon exact evaluation of the circulation and roentgenographic visualization of the vessels is a prerequisite. When a generalized vascular disease exists, such as arteriosclerosis, introduction of a prosthesis leads to stasis and thrombosis. Several cases are presented to illustrate the points mentioned.

—*Andrew P. Adams, M.D.*

The Diagnosis and Treatment of Renal Artery Stenosis. J. J. Brown, K. Owen, W. S. Peart, J. I. S. Robertson, and D. Sutton. *Brit. M. J.*, 1960, 2: 327.

In the diagnosis of renal artery stenosis, the presenting symptoms are not necessarily helpful. Frequently a systolic bruit is heard over the affected artery. The intravenous pyelogram will often show better contrast on the side of the stenosis with evidence of reduced urine flow. Occasionally, however, a poor pyelogram will be obtained on the side with the lesion. Renal arteriography and ureteral catheterization studies are the most valuable investigative procedures and must be regarded as complementary rather than rival ones.

Although there is no shortcut to the selection of patients who will be improved by operation, surgical results have been, for the most part, gratifying. Direct arterial pressure measurements should always be made at operation and checked after completion of the reconstructive procedure.

Among the surgical procedures in use today are thromboendarterectomy, splenorenal anastomosis, renal artery reimplantation, excision of stricture, bypass grafting, and nephrectomy.

—*Harold Laufman, M.D.*

The Surgical Significance of Spontaneous Intra-abdominal Hemorrhage. David A. Blumenstock and Alfred Jaretzki III. *Surg. Clin. N. America*, 1960. 40: 917.

Spontaneous retroperitoneal hemorrhage occurs most commonly in patients over 50, most frequently from the abdominal aorta. Spontaneous hemorrhages may arise from other large arteries including the splenic artery, mesenteric artery, and renal arteries. Severe atherosclerosis of these major vessels, with or without aneurysm, is the commonest cause of this condition.

The early symptom of spontaneous retroperitoneal hemorrhage is most commonly severe abdominal pain localized in the anatomic area of hemorrhage. Although severe shock may develop rapidly, the initial loss of blood is frequently not severe. In the latter instance, the diagnosis becomes difficult and the condition must be differentiated from other causes of an acute abdominal condition, including such conditions as acute diverticulitis of the colon. A latent period varying from several hours to as long as a period of weeks usually follows the initial phase. This period is characterized by the signs and symptoms of chronic blood loss and may be associated with abdominal distention and vomiting. The terminal event is usually characterized by sudden intensity of the pain, profound shock, and exsanguinating hemorrhage.

The most important diagnostic aid in spontaneous retroperitoneal hemorrhage is a high index of suspicion. Acute severe abdominal pain associated with a pulsating mass or other clinical findings compatible with aneurysm is indicative of retroperitoneal hemorrhage until proved otherwise. Early abdominal exploration must be performed when the suspicion of spontaneous retroperitoneal hemorrhage exists. Extensive diagnostic work-up is contraindicated. It is of the utmost importance that a sufficient amount of blood be available to compensate for the usual loss and to make possible an extensive aortic resection.

In the surgical management of these patients, the rapid control of the aorta proximal to the ruptured aneurysm is of vital importance. Some surgeons have employed thoracoabdominal incisions or concomitant thoracotomy to control the aorta in the chest above the area of extravasated blood. The clamp thus placed is soon removed and placed beneath the renal arteries when the aorta in this region has been isolated. The required resection and graft are then performed.

—*Frank J. Milloy, M.D.*

Multiple Ectasias and Aneurysms of Branches of External Carotids (Disontogenia vascolare a tipo di dolicomegarteria con aneurismi multipli nel territorio delle carotidi esterne). G. Di Matteo and A. Di Bartolomeo. *Ann. ital. chir.*, 1960, 37: 196.

Leriche, in 1927, reported a chance finding at laparotomy of markedly enlarged colic arteries in a 50 year old woman. Other reports have appeared sporadically, including reports of ectatic superior thyroid, carotid, femoral, and iliac arteries. The condition has been named dolichomegartery and is characterized by increased length and resultant tortuosity of the vessels, as well as increased size.

The authors review the meager reports in the literature and conclude that there is a true, or primary, dolichomegartery and a secondary one. The secondary dolichomegarteries are those dilatations due to actual arteriosclerotic disease in the vessel walls or dilatation proximal to obstruction from a skeletal anomaly, such as a cervical rib. Primary ectasias differ from aneurysms in that the ectasias have an essentially normal wall with all components, whereas the wall of aneurysms is mostly fibrous and hyaline connective tissue.

Eliminating the cases of arterial ectasia associated with vessel wall diseases such as syphilis and arteriosclerosis, and the cases associated with trauma and skeletal anomalies, reduces us to explaining true dolichomegartery as some sort of congenital alteration. The authors suggest the name "segmental arterial dysontogeny" or "regional panvascular dysontogeny." The latter term allows for the frequent finding of dilated veins in association with the enlarged arteries. The congenital theory or at least some structural predisposition toward dilatation is supported by the fact that many of the patients are young. One must realize that such congenitally abnormal arteries are subject to regressive arterial disease such as arteriosclerosis just like any other segment of artery, and possibly more so.

The authors consider Haller's suggestion that the arterial ectasias are due to congenital absence of vasa vasorum as unproved. Also unproved is another theory, that spontaneous lacerations occur in the media of the involved vessels.

The authors present a case of a 38 year old man in whom a pulsating swelling developed on the left side of the face. Carotid arteriograms revealed dilatation and tortuosity of the left facial, lingual, and superior thyroid arteries, beginning at the points at which they branched off from the external carotid. The right facial artery was likewise ectatic, and there was a small aneurysm on the mandibular branch of the right facial artery. The patient had been beaten repeatedly on the face during the war, and the condition had developed slowly subsequently. At operation the authors ligated the origins of the left superior thyroid, lingual, and facial arteries, and through another incision tied off the right facial artery. The veins accompanying these arteries were likewise ectatic; some of them had to be ligated. The patient made a good recovery and the pulsating swelling on his face subsided. —*William B. Gallagher, M.D.*

Dissecting Aneurysm of the Aorta. BLAIR D. ERB and I. FRANK TULLIS. *Circulation*, 1960, 22: 315.

THIS REPORT is based on the clinical experience with dissecting aneurysms of the aorta in 30 autopsied cases at the John Gaston Hospital, Memphis, Tennessee, during the last 10 years. In this series the incidence of antemortem diagnosis was 27 per cent. The average age of the patients was 56 years, and men outnumbered women 2 to 1.

In dissecting aneurysms of the aorta due to a focal degenerative process, cystic medionecrosis, there is a hemorrhage in the aortic media with separation of the layers of the aortic wall. There may be an associated intimal tear in the ascending aorta just distal to the aortic valves. Another tear may occur in the aortic arch or in the descending or abdominal aorta. The clinical picture depends upon the site of the tear and the extent of the dissection. Certain conditions such as Marfan's syndrome, pregnancy, and preexisting hypertension are frequently associated with dissecting aneurysms, and their presence should sharpen the suspicion of the clinician in establishing a diagnosis. Involvement of multiple systems is characteristic since, when the aorta is damaged, branches to other organs may be affected. The onset is usually sudden and often related to exertion, and in most cases accompanied by substernal pain or pain radiating to the jaws, shoulders, abdomen, or extremities. New aortic systolic and diastolic murmurs often appear. Cardiac tamponade may occur from rupture of the aneurysm into the pericardial sac. Peripheral pulses may disappear. There may be signs of an acute abdominal condition or renal involvement. Neurologic changes may result from spinal cord damage or carotid artery occlusion. Roentgenograms of the chest and angiocardiography are often helpful in establishing a diagnosis. Early and accurate diagnosis is required if operation is to improve the natural survival rate of 10 per cent in this condition.

—*George R. Holswade, M.D.*

Acute Renal Insufficiency Following Aortic Surgery. P. D. DOOLAN, R. A. WIGGINS, G. B. THIEL, K. J. LEE, and EDWARD MARTINEZ. *Am. J. Med.*, 1960, 28: 895.

THE AUTHORS PRESENT the salient clinical data from 11 patients in whom acute renal failure developed after abdominal aortic operation. Age of the patients varied from 44 to 75 years. Three patients suffered with occlusive disease and the remainder with aneurysms of the aorta, 5 of which had ruptured. Six patients survived. Extensive renal infarction occurred in 3 of the patients.

Current knowledge concerning the cause of acute renal insufficiency is reviewed, and the authors believe that continuation of studies concerned with renal vasoconstriction is feasible. The recommendation to infiltrate the renal pedicle during operation on the aorta especially in patients in whom rupture of an aneurysm has occurred, is supported.

—*Allan D. Callow, M.D.*

Elastic Stocking Compression and Venous Blood Flow. B. R. MEYEROWITZ and ANN CROOK. *Lancet*, Lond., 1960, 2: 122.

ELASTIC STOCKING COMPRESSION of the lower extremities has frequently been described as a valuable measure for lowering the incidence of pulmonary embolism from thrombophlebitis of the lower extremities. Iodine 132-tagged albumin was used to measure the venous flow rates in the lower extremities of 31 randomly selected patients who were subjected to concentric compression of the lower extremities by a one-way stretch elastic stocking. Venous blood flow was more rapid in the stockinged leg than in its opposite member in all but 2 patients and the rate was more than doubled in 71 per cent of the patients. The elastic stocking is thus thought to increase the rate of blood flow in the legs of most patients and the prophylactic use of the stockings should decrease morbidity from venous thrombosis and pulmonary embolism. —*Allan D. Callow, M.D.*

Percutaneous Use of Hydrogen Peroxide for the Treatment of Peripheral Vascular Disturbances (Zur epicutanen Anwendung von Wasserstoffperoxyd in der Behandlung peripherer Durchblutungsstoerungen). H. B. SPRUNG, R. LUDEWIG, and H.-CH. GABSCH. *Langenbecks Arch. klin. Chir.*, 1960, 293: 671.

ANIMAL EXPERIMENTS have brought about the possibilities to improve oxygenation in tissues by percu-

taneous applications of hydrogen peroxide topically, thereby increasing capillary oxygen tension without harm.

On the basis of these studies, 90 patients with peripheral vascular anoxemia were treated by topical application of a 10 per cent hydrogen peroxide salve in a stable base. One gm. of this ointment yields about 30 c.c. of oxygen.

The cases included arteriosclerosis, Sudeck's atrophy, varicose ulcer, acute vascular occlusions, frozen tissue, trauma of the feet, rupture of the popliteal artery, pedicle grafts, and pseudarthrosis of the femoral neck.

The material was classified into 4 groups according to the severity of symptoms and duration of illness. All patients showed subjective as well as objective improvement. Skin temperatures increased by 3.3 degrees C. on the average. White or cyanotic skin turned red; the feeling of cold disappeared; claudication diminished; and wounds healed more rapidly. There were no untoward effects.

In 19 cases, analysis of blood gases and catalase activity were carried out. Oxygen values in venous blood increased and carbon dioxide values decreased. No disturbances in catalase balance were observed.

—Otto Weiss, M.D.

Amputations of the Lower Extremity in Emergency Surgery (Les amputations des membres inférieurs en chirurgie d'urgence). R. Favre. *J. chir.*, Par., 1960, 80: 54.

Amputation is a neglected but vital subject of importance not only in war surgery but also in the management of those suffering multiple injuries from industrial, mine, automobile, or airplane accidents. The author reviews the important aspects of this subject, based, in part, upon his experiences in the Indo-China war. He emphasizes the facts that amputation is an acknowledgment on the part of the surgeon of inability to save life or limb by more conservative operation, and that the loss of limb is an unpleasant and critical decision for both the patient and surgeon. Earlier receipt of the injured from the battlefield and from the site of accident in civilian life, arterial prostheses, blood transfusions, and antibiotics have modified the classical indications and timing for amputation.

The indications for amputation are trauma, infection, and ischemia. Trauma is the principal one. Injury severe enough to culminate in ischemic gangrene is the main indication. The limb is preserved until arterial prostheses, nerve repair, orthoplasty, and control of infection have been of no avail or have failed to effect a useful extremity. A shattered, partially traumatically amputated limb in the individual with multiple injuries and in deep shock is another indication; in this instance the first priority is given to the life-endangering injuries, the shattered limb being placed in ice for later attention.

Infection, the second indication, is now usually a secondary cause for amputation, since tetanus and gas gangrene are rare, and is frequently the result of invasive infection due to delayed, inadequate operation or anti-infective therapy; delayed massive hemorrhage after superinfection of a repaired artery is a rare indication.

Ischemia, the third indication, is dry or wet gangrene from the combination of trauma and vascular insufficiency and, more recently, delayed failure of arterial repair or the ischemia of a belatedly placed arterial prosthesis. Crush injury requires evaluation of effects on both the limb and kidneys.

The amputation should (1) provide an uninfected, vascularized, painless stump capable of accepting a functioning prosthesis, the placement of the scar being a factor of influence on the latter; (2) remove all of the pathologic condition; (3) be of optimal length; and (4) not be a shock-inducing procedure. The patient should be normovolemic before operation whenever possible. Guillotine amputation is easiest but now mostly of historical interest; the infundibuliform or cuff procedure is now the most common; primary suture is rarely indicated. After 4 days skin traction is instituted and the weight increased as indicated. Physical therapy and psychotherapy are requisite in the postoperative program. An unsatisfactory scar is revised at the earliest practicable moment.

Ischemia and gangrene still produce the highest postoperative mortality. *—Edwin J. Pulaski, M.D.*

SURGICAL MANAGEMENT

PREOPERATIVE AND POSTOPERATIVE CARE

Corticosteroids in Preoperative Medical Management of Ulcerative Colitis. W. B. EWART and J. E. LENNARD-JONES. *Lancet*, Lond., 1960, 2: 60.

THE AUTHORS have reviewed 131 histories of patients who had a one-stage subtotal colectomy and ileostomy for ulcerative colitis at St. Mark's Hospital, London, England. To see whether corticosteroids increased or decreased the hazard of operation, they compared the postoperative course of the 52 patients who had received corticosteroids at any time in the year preceding operation with that of the 79 who had not. Each of these series was subdivided into 4 groups according to severity of condition: (1) good general condition, inactive colitis; (2) good general condition, mild active colitis; (3) poor general condition, or severe active colitis, or both; and (4) critical illness requiring emergency operation.

There were 7 deaths, 13 per cent, in the steroid series and 5, 6 per cent, in the nonsteroid. However, among the patients severely ill at the time of operation (groups 3 and 4) the mortality was equal, and 11 of the 12 deaths occurred among these patients. Peritonitis caused more than half of the deaths in both groups; the other principal cause of death in both groups was immediate postoperative circulatory collapse. The average hospital stay was 34 days for patients in the steroid series and 28 days for those in the nonsteroid. Although this is significant, the uneven distribution of good risk patients and the small numbers involved may prevent its being conclusive. Preoperative perforation of the bowel occurred with equal frequency in both series; but surgical perforation of the bowel was more frequent in the steroid group, 6 cases, than in the other, 3 cases. No correlation was found between the preoperative dose of corticosteroids and the surgical result.

This series revealed that the mortality among patients in good general condition with inactive or mild colitis (groups 1 and 2) was 1 per cent, whereas the mortality among severely ill patients (groups 3 and 4) was 19 per cent. It is known that corticosteroids induce remission in a high proportion of patients with active colitis. The authors believe that no patient seriously ill with colitis should be operated upon, except for acute complications, unless vigorous medical treatment has failed, and that this treatment usually should include the use of corticosteroids.

—*Stephen W. Carveth, M.D.*

An Evaluation of Drugs Used for Oral Premedication of Children. B. W. GUNNER. *Med. J. Australia*, 1960, 2: 47.

VARIOUS DRUGS for oral premedication were evaluated as to preoperative vomiting, quality of sedation, drying of secretions, postoperative vomiting, and postoperative restlessness in children ages 2 through 12 years who underwent ear, nose, and throat operative procedures. The following drugs were used in combination with hyoscine hydrobromide: methylpentynol, trimeprazine tartrate, and pethidine hydrochloride. It was found that methylpentynol-hyoscine and trimeprazine-hyoscine mixtures gave significantly better preoperative sedation and caused less postoperative vomiting than the other mixtures. There was no difference in the effect on drying of secretions and postoperative restlessness. —*John W. Braasch, M.D.*

WOUNDS AND THERMAL INJURIES

The Effects of Proteolytic Enzymes on Human Serum (Experimentelle und klinische Untersuchungen ueber die Einwirkung proteolytischer Fermente auf menschliches Blutserum). WILHELM MARGGRAF, HEINZ-SIEGBERT FÜRSTENBERG, and WILHELM GREUER. *Langenbecks Arch. klin. Chir.*, 1960, 293: 723.

PREVIOUS STUDIES have shown that there is a decrease in proteolytic enzymes in homogenates of liver from traumatized animals and that there is an increase in proteolytic enzymes in the serum of such animals. These changes are most marked 12 to 36 hours after injury. The present report concerns the effect of these enzymatic alterations on the serum proteins. In experimental animals there is a decrease in serum albumin 3 hours after tissue damage, followed by a rise in the α and β globulins. These shifts in serum proteins are presumed to be caused by the formation of paraproteins. The addition of trypsin to human serum in vitro causes similar changes in protein distribution.

Tissue damage in humans, produced experimentally by the intramuscular injection of autogenous whole blood, was followed by a characteristic decrease in serum albumin and a concomitant rise in β globulins and sometimes also in α_1 and α_2 globulins. The serum plasminogen content decreased as the serum albumin fell and the β globulins rose. It is argued that, subsequent to tissue damage, the fibrinolytic proenzyme plasminogen is activated to plasmin. Plasmin immediately combines with a trypsin inhibitor normally found in the albumin fraction and produces a protein complex which, in electrophoresis, migrates with the β globulin fraction.

Parallel decreases in plasminogen and in trypsin inhibitor were found in blood drawn from a patient after prostatectomy and in blood from a patient who had suffered burns of the hands and face. The authors expect these experiments to lead to improvements in diagnosis and therapy, as for instance in the assessment and treatment of injury by heat.

—*Elmer V. Dahl, M.D.*

Staphylococcal Wound Infection in a Surgical Unit. PHYLLIS M. ROUNTREE, MAUREEN HARRINGTON, JOHN LOEWENTHAL, and RICHARD GYE. *Lancet*, Lond., 1960, 2: 1.

THIS IS a report of a 6 month survey of the incidence of clinical infection of clean surgical wounds and of bacteriologic cross infection of dirty wounds in a surgical unit.

A total of 217 wounds was examined and an incidence of cross infection in 14 per cent of the 198 clean wounds and in 68 per cent of the 19 dirty wounds was found. The over-all incidence was 18 per cent.

Early in the study the clean wounds were dressed with a conventional gauze pad, but later a plastic spray type of dressing was used to seal the wound. Seven per cent of the 171 wounds covered with plastic became infected and 56 per cent of the 27 clean wounds covered by a gauze pad became infected.

Of the 40 wounds showing cross infection, 35 were infected with Staphylococcus aureus either alone or in combination. The predominant staphylococcus in this unit was phage type 47, the only other strain being found in more than one wound was phage type 80-81.

A study of the air in the operating room by means of the slit sampler revealed only 13 colonies of Staph. aureus on all of the plates during a total of 25 operations. In no instance was the staphylococcus subsequently cultured from a patient's wound detected in the operating theater air at the time of operation.

During the 25 surgical procedures, 167 nasal swabs were taken and Staph. aureus was isolated from 46 per cent. No patient was infected in the operating theater with any of these strains.

Nasal swabs were taken from each patient within 36 hours of admission. Type 47 staphylococci were detected in 14 per cent of the weekly swabbings of the patients and in 8 per cent of weekly swabbings of the staff. Fifty-eight per cent of the 98 strains found in patients' noses at the time of admission were penicillin sensitive, but only 12 per cent of the 84 strains acquired in the hospital were penicillin sensitive.

The authors conclude that there was little evidence for suspecting that the infection was incurred during the operation itself but that more likely it occurred during the patients' stay on the ward. The rate of cross infection was great enough to reduce the effective use of the beds by about 5 per cent.

—*John H. Davis, M.D.*

INFECTIONS AND ANTIBIOTICS

Experience with Amphotericin B. JOHN H. SEABURY and HARRY E. DASCOMB. *Ann. N. York Acad. Sc.*, 1960, 89: 202.

AMPHOTERICIN B is an antifungal antibiotic produced by a streptomycete. Its major antifungal activity in vitro is against those species having a yeastlike form in tissue. The inhibitory capacity of amphotericin B remains constant at room temperature for 5 days. After this, there is fairly rapid deterioration. If easily recognized growth is not present in the control tubes by the fifth day, the sensitivity studies will be inaccurate. Grading and comparison of growth are easier on solid media than in liquids.

The first clinical trials of amphotericin B were made with material for oral administration. Relatively large doses produced therapeutic effects in some patients. Basic treatment however is now by the intravenous route. Initially, a dose of 0.25 mgm./kgm. of body weight is given. The total dose for adults is increased by 5 mgm. every other day except those patients with acute cryptococcal meningitis, in whom the dosage is increased by 5 mgm. daily. The maintenance dose is determined by toxicity and side effects, but is never greater than 1.5 mgm./kgm.

Since the in vitro sensitivity of the yeastlike fungi varies widely, it is desirable to give amphotericin intrathecally early in the treatment of mycotic meningitides. Both the insoluble suspension and the solubilized antibiotic are well tolerated when injected into abscesses, pyarthroses, suppurated lymph nodes, areas of osteomyolitis, and pleural empyema. Up to 30 mgm. of the solubilized antibiotic is required to sterilize a coccidioidal pyarthrosis. This amount produces no side effects.

Intravenous administration of amphotericin B is accompanied by a high incidence of side effects and significant toxicity. Chills, fever, headache, and nausea are usually kept at a tolerable level by giving the patient acetylsalicylic acid as a premedication and incorporating an antihistaminic in the infusion fluid. If these measures fail, 25 mgm. of the sodium succinate ester of hydrocortisone given intravenously has been remarkably effective in the authors' experience.

Seven patients with systemic blastomycosis have been treated with amphotericin B. The antibiotic was given initially by the intramuscular route to 2 patients with prompt and unequivocal response in both. Eight patients with central nervous system cryptococcosis were treated; 2 of them died. The treatment of 8 patients with histoplasmosis was most encouraging, whereas treatment of coccidioidomycosis proved inadequate. Treatment of 1 patient with a disseminated type sporotrichosis and 2 patients with lymphocutaneous disease resulted in cure without relapse to date. Treatment of lymphocutaneous sporotrichosis by the intravenous administration of amphotericin is not recommended however, since this type of disease responds well to oral iodides in most instances. The treatment of moniliasis in 2 patients was inconclusive since neither patient had disease suitable for therapeutic evaluation.

It was concluded that amphotericin should be valuable in all fungus infections having a yeastlike tissue phase. Although a mild normochromic anemia developed in many of the patients it was never significant clinically, nor greater than could be accounted for by the underlying disease. Local instillation of amphotericin B is well tolerated and opens up a new phase of treatment. Dissolving the antibiotic in 1 per cent procaine makes it suitable for local infiltration and injection into suppurated lymph nodes and pyarthroses. No additive is necessary for intrapleural instillation.

—*Stephen A. Zieman, M.D.*

Staphylococcal Pathogenicity: Community and Hospital. DONALD A. HENDERSON and CLINTON VAN ZANDT HAWN. *Surg. Clin. N. America*, 1960, 40: 971.

CULTURES were obtained from the anterior nares and pharynx of 633 children all less than 19 years old from 254 families who lived in and around Cooperstown, New York. Penicillin-resistant staphylococci were removed from 20.8 per cent of the children. Age was not a significant factor in the frequency of positive cultures in this study.

There was no evidence that hospitalization serves a significant current role in the propagation of the community's reservoir of penicillin-resistant strains.

However, all children from whom the more resistant strains were recovered had a history of close hospital association within the preceding 18 months, either directly or through members of their family. Thus the propagation of penicillin-resistant staphylococci seemed to be arrested at the family level.

Among those who had received penicillin during the previous 4 months, 38.9 per cent carried penicillin-resistant strains compared to 19.2 per cent of those who had received no antibiotics and to 21.4 per cent of those who had received tetracycline. The differences observed between the two former groups are statistically significant. This implies that penicillin plays an important role in the growth and maintenance of the community reservoir of resistant staphylococci.

It is the authors' opinion that the increasing prevalence of penicillin-resistant staphylococci is more a problem related to the use of penicillin among outpatients than a problem of cross infections in the hospital. However, in the case of the more broadly resistant strains of penicillin-resistant staphylococci, 80/81 and 52/80, the hospital did appear to be the primary source. —*Stephen W. Carveth, M.D.*

EXTRACORPOREAL CIRCULATION

An Effective Blood Heat Exchanger for Deep Hypothermia in Association with Extracorporeal Circulation but Excluding the Oxygenator. VIKING OLOV BJÖRK. *J. Thorac. Cardiovasc. Surg.*, 1960, 40: 237.

SIMULTANEOUS right and left shunts were performed, the right shunt being used for oxygenation of the blood utilizing the animal's own lungs and the left shunt being connected to the heat exchanger. Under hypothermic arrest, a ventriculotomy was performed. When the temperature was raised to 30 degrees C., the heart assumed its regular rhythm; if not, it was electrically shocked.

The heat exchanger is built of stainless steel tubes. Warm or cold water is circulated and the temperature thermostatically controlled. The first step of cooling should start with a slow perfusion rate of about 100 c.c./min. in small patients and up to 1,000 c.c./min. in heavier patients. When ventricular fibrillation begins, left-sided perfusion is stopped immediately.

Through a stab wound in the right ventricular wall, a cardic catheter is inserted into the pulmonary artery. Once the catheter is in place, perfusion is started simultaneously on the left and right sides. The blood pumped through the lungs immediately drains into the left reservoir and is pumped through the heat exchanger back into the femoral artery. A period of total arrest of longer than 45 minutes is not recommended for an adult. Both right and left-sided perfusions are continued until a regular heart beat returns. It may be necessary to wait until a rectal temperature of 28.8 degrees C. has been reached before a regular heart rhythm will return spontaneously. Once a regular heart beat is restored, the right perfusion is stopped. The left perfusion is continued until the rectal temperature is above 34 degrees C. The shortest possible rewarming time is best.

The plasma hemoglobin level was 19 mgm. per cent compared with 83 mgm. per cent after the use of a pump oxygenator. The red blood cell count did not change, nor did the hematocrit or the hemoglobin. The white blood corpuscles showed a significant decrease during the lowest temperature at deep hypothermia which was corrected during the rewarming period. No postoperative metabolic acidosis occurred. During circulatory arrest in deep hypothermia the myocardium is better protected than it is during anoxia in potassium arrest.

The surgical procedure is easier to perform with this method and can be completed in a flaccid bloodless heart. No coronary perfusion or blood loss through a coronary suction takes place. Cardiac arrest was prolonged in the first series of clinical cases; 6 patients survived the operation and 3 died of brain damage. The disadvantages of the use of deep hypothermia without an oxygenator are: (1) time limit of 45 minutes for circulatory arrest, (2) possibility of brain damage in children, (3) the use of two parallel pump systems is much more difficult, and (4) the method is considerably more time consuming.

Deep hypothermia with extracorporeal cooling without an oxygenator, according to Drew, has been used in 17 clinical cases and the results compared with those obtained with the pump oxygenator system. Since this study was performed, the original deep hypothermia method has been abandoned.

—*Gabriel P. Seley, M.D.*

Open Heart Surgery Without the Need for Donor Blood Priming in the Pump Oxygenator. WILFORD B. NEPTUNE, JAMES A. BOUGAS, and FREDERICK G. PANICO. *N. England J. M.*, 1960, 263: 111.

THE APPARATUS which is described here is essentially a bubble-type oxygenator combined with two pumping ventricles making a compact unit with a small priming volume. The pumping system which is designed for gravity drainage is actuated by oxygen pressure but can be manually operated by an emergency lever. For adult use the apparatus is primed with from 500 to 1,000 ml. of physiologic saline solution. After the patient has been given heparin and all cannulations are completed, blood from the patient enters the apparatus and layers beneath the saline during the operation of the pump oxygenator. Coronary sinus blood is aspirated through a low pressure suction device and returned to the system. At the end of the perfusion most of the blood is returned to the patient while the saline remains in the reservoir. There is little admixture between the blood and the saline layers and it is estimated that the patient usually receives a total volume of less than 250 ml. of saline.

The authors report their experience with 25 patients almost all of whom are adults with acquired heart disease. In these the total blood expenditure for operation and the postoperative period was 4 standard acid-citrate-dextrose blood bank units or less. The 4 deaths in this series were not believed to be related to the extracorporeal perfusion. No bleeding syndromes were encountered. Plasma hemoglobin levels were maintained at a low level in perfusions which ranged from 15 to over 90 minutes. Flow rates of 70 to 90 ml. per kgm. maintained the mean central aortic pressure between 70 to 90 mm. Hg.

In addition to reducing the volume of blood necessary for open heart surgery and the hazard of serum

hepatitis, the apparatus described also is readily available in a few minutes for emergency use.

—George R. Holswade, M.D.

ANESTHESIA

The Concentration Factor in Local Anesthetic Solutions. E. CHERASKIN and C. BRUNSON, JR. *J. Oral Surg.*, 1960, 18: 275.

THIS REPORT is a review directed to the problem of the concentration of local anesthetic solutions and vasoconstrictor substances. The criteria for inclusion of material in this report are that the data must deal specifically with the concentration factor, the observations have been made on human subjects, and the presented data can be quantitated. Available data were analyzed in terms of induction time, depth of anesthesia, extent (spread of anesthetic effect), duration of anesthesia, and side effects of local anesthetics and vasoconstrictor substances.

There is evidence that each of the two ingredients plays a role in the onset, depth, spread, and duration of anesthesia. However, there is evidence to indicate that additional antagonism or synergism may also play a role. The authors concluded that the greater the concentration of local anesthetic solution, the more rapid the rate of induction, the greater the depth of anesthesia, the more extensive the anesthetic spread, and the longer the anesthesia lasts; induction time, depth, extent, and duration of anesthesia are enhanced the smaller the total volume of injected solution for a given drug dose; the greater the concentration of vasoconstrictor agent, the more rapid the rate of induction, the greater the depth, spread, and duration of anesthetic effect. The evidence, though meager, suggests more side effects when epinephrine is added to a local anesthetic solution. *—Mary Frances Poe, M.D.*

Clinical and Experimental Studies on Effects of Succinylcholine. ÅKE WÅHLIN. *Acta anaesth. scand.*, 1960, 4: Suppl. 5.

OBSERVATIONS of various effects associated with the use of succinylcholine prompted a closer examination of the drug in clinical practice. This article is a résumé of eight previous publications by the author and his colleagues on their investigations of the actions of succinylcholine. The actions included twitches in striated muscles after injection of the drug, marked enophthalmos elicited in both man and animals under general anesthesia, elevation of the cerebrospinal fluid pressure, and profuse oozing during operations.

An electromyographic investigation was made on the fasciculations elicited by administering succinylcholine to man under general anesthesia. A type of large polycyclic potential, hitherto undescribed in man, was frequently recorded. In addition, polycylic potentials characteristic of myopathy were observed, together with a number of potentials of short duration and of the fibrillatory type at the end of the period of activity. The electromyographic picture and potentials recorded in man strongly suggest that there is an unorganized mass activity of the muscle cells. Corresponding studies on the frog and the cat revealed essentially the same electromyographic pattern. By experimental elimination of the influence of the central nervous system the fasciculations elicited by succinylcholine were demonstrated to have peripheral origin, the drug probably stimulating the endplates and nerve terminals of the extrafusal muscle system.

Electromyographic studies of the extrinsic muscles of the human eye indicated that these muscles probably do not affect the position of the eyeball when the subject is under general anesthesia. In animal experiments, the extrinsic muscles were eliminated under practically physiologic conditions in a specimen in vivo. It was concluded that succinylcholine relaxed the smooth muscles of the orbit. These observations, especially those relating to the smooth muscles of the orbit, have thrown new light on the classical problems of the mechanism behind enophthalmos and exophthalmos. A theory of the importance of the smooth muscles for the occurrence of exophthalmos in man is presented. The reason for the increase in intraocular pressure under the influence of succinylcholine is probably to be sought within the eyeball rather than in any extrabulbar muscle factor.

Succinylcholine was found to relax the smooth muscles of the blood vessels, which may explain the increased bleeding that has been observed in operations when this drug has been used. The results obtained indicate the dilatation of the blood vessels. An increase of the peripheral blood flow was recorded under the influence of intravenously administered succinylcholine. Since only slight fluctuations of the arterial blood pressure were recorded and the blood flow in the vessels in question increased, this indicated a decrease in the vascular resistance.

The intraspinal fluid pressure in man underwent a marked increase under the influence of succinylcholine. There would seem to be grounds for believing that this rather rapid effect of the drug on the intraspinal fluid pressure is due to an action on the cerebral blood vessels especially in view of the close relationship between cerebrospinal pressure and the cerebral blood flow. The results of the tests would suggest that the cerebral blood flow increased.

—Mary Frances Poe, M.D.

Incidence and Prevention of Muscle Pain Following the Administration of Succinylcholine. LEROY F. LAMOREAUX and KARL F. URBACH. *Anesthesiology*, 1960, 21: 394.

MUSCLE PAIN, similar to the ache that follows strenuous exercise, has been observed after the intravenous administration of succinylcholine. The cause of this pain is unknown, but it may be related to muscle fasciculation. Slowing down the rate of administration of the drug does not eliminate the pain.

Twenty-five patients were given 50 mgm. of succinylcholine as a single intravenous injection and postoperative pain developed in 40 per cent. When the same amount of the drug was given to 20 additional patients, but preceded by 3 mgm. of d-tubocurarine, none of the patients had the typical pain in the postoperative period. When 60 patients were given succinylcholine, 0.2 per cent solution by slow infusion, or this plus 3 mgm. of d-tubocurarine prior to the solution, pain typical of this syndrome developed in 16 per cent.

This study failed to demonstrate any correlation between the severity of muscle fasciculations and the development of postoperative muscle pain. It was shown, however, that small doses of d-tubocurarine given immediately prior to the rapid intravenous injection of the succinylcholine eliminated the pain.
—*John H. Davis, M.D.*

An Electrophysiological Study on the Sensory Blocking Mechanism of Inhalation Anesthetics: Nitrous Oxide, Ether, and Cyclopropane. MASAHIKO KITAHATA. *Wakayama M. Rep.*, 1960, 5: 47.

SINCE ANESTHETICS vary a good deal in the amount of relaxation, hypnosis, and analgesic effect, the stages of anesthesia used for ether have become less useful as the number of agents multiplied. General anesthesia may be more usefully divided into four components: (1) sensory block, (2) motor block, (3) mental block, and (4) reflex block. It is important to know the potency of each anesthetic agent in regard to each of the components of its action.

In the author's experiments cats were immobilized with succinylcholine. Electrical recordings were made from the right cerebral hemisphere after left hemispherectomy and from the midbrain after ablation of the cerebral hemispheres and cerebellum. Needles for recording impulses were inserted under stereotaxic control. Concentrations of anesthetic agents studied were those that would produce the maximum effects, 80 per cent for nitrous oxide with a flow of 1 l./min., 10 to 15 per cent for ether with a flow of 2.5 l./min., and 50 per cent for cyclopropane with a flow of 1 l./min.

The anesthetic agents markedly depress the second deflection of the evoked potential in the postcruciate gyrus of the cerebral cortex, the amount of depression being 32 per cent of the control level for nitrous oxide, 14 per cent for ether, and 6 per cent for cyclopropane, indicating that the depressing effect of the agents is specifically cortical.

Depression of the negative deflection of evoked responses all along the lateral pathway when the positive is not depressed suggests that there is a functional interrelation between the deflections, with some depressing effect, although it is not known just what the negative deflection of evoked response represents.

In the extralemniscal medial pathway, anesthesia depresses evoked responses at the cortical, thalamic, and midbrain levels. It is conceivable that through the depressing effect of anesthetic agents on the midbrain reticular activating system, subjects are rendered unconscious, thus disabling sensory perception. Cyclopropane, ether, and nitrous oxide are effective in that order. It is known, however, that ether analgesia can exist without blockade of the reticular activating system.

Latent periods of conduction are not affected by the anesthetic agents, indicating that the conduction times of nerve fibers are not involved in anesthesia.

The availability of muscle relaxing agents that do not affect the central nervous system has made studies not previously possible a practicality. The author concludes that sensory impulses are perceived at the cortical level, and that anesthetic agents have their chief depressing action on the cortex. Also the depressing effect of anesthetics on the midbrain reticular activating system probably plays an important role in sensory blockade and is responsible for unconsciousness.
—*Carl H. Calman, M.D.*

Experiences with Cardiac Catheterization Using Halothane Compressed Air Anesthesia. MARTIN LLOYD NORTON and YUKIO KUBOTA. *Anesthesiology*, 1960, 21: 374.

MANY of the reported techniques for induction of anesthesia for cardiac catheterization leave much to be desired for meeting rigid criteria. The authors present their experiences with 38 patients anesthetized a total of 54 times using halothane vaporized by compressed air. Oxygen was metered into the system to give an oxygen content of 21.5 to 25 per cent.

The age distribution of the patients was from 3 months to 14 years and the weight distribution was from 9 to 132 pounds.

All patients had an oral airway without tracheal intubation. The state of the patient and the depth of anesthesia were determined by clinical observation and by analysis of the electroencephalogram. The average time for the procedure was 2.2 hours, range 1.5 to 4.0 hours.

Eighteen patients served as their own controls, the procedure being first accomplished with the patient awake and then repeated using the aforementioned technique.

No significant variations were found in oxygen or carbon dioxide content in the patients serving as their own controls. Peripheral pressures measured in the femoral or brachial arteries did not reveal any appreciable degree of hypotension. No bradycardia nor tachypnea was noted.

Cardiac arrhythmias, nodal tachycardia, developed in 2 patients during induction of anesthesia and these patients required digitalization during the procedure because of ventricular tachycardia after distention of the right atrium or entrance of the catheter into the coronary sinus. These arrhythmias were no different from those encountered with other types of anesthesia.

The authors conclude that this technique is satisfactory, does not interfere with the diagnostic procedure, and does not alter the blood chemical determinations.
—*John H. Davis, M.D.*

The Effect of Ergotamine on Blood Pressure, Especially in Spinal Anesthesia. PER KLINGENSTRÖM. *Acta anaesth. scand.*, 1960, 4: Suppl. 4.

THE OBJECT of this work was to show how ergotamine can be used as a blood pressure stabilizing agent with long-lasting effect and to try to explain its mode of action. The monograph is divided into two parts, each of which has two chapters. Part 1 is a survey of the literature on the effects of spinal anesthesia and of ergotamine. Part 2 is a report of the author's investigations of the effects of ergotamine on blood pressure, especially in spinal anesthesia.

The first chapter includes a short survey of the physiologic causes for the fall of blood pressure in spinal anesthesia. The fall in blood pressure is caused by the block of the vasoconstrictor nerves which results in peripheral vasodilatation and abnormal blood distribution. This circulatory condition has

hitherto been treated with sympathomimetic drugs, administered either subcutaneously, intramuscularly, or intravenously in combination with the head-down position and intravenous drip infusions. Often these methods cannot be easily and effectively applied and controlled in practice.

The next chapter deals with the pharmacophysiology of ergotamine, with special regard to the effects on the circulation and blood pressure of small doses, 1 to 5 mcgm./kgm. of body weight. Both central (reflexogenic) and peripheral actions occur. Reflectorily conditioned effects are a reduced pulse rate and an increased blood pressure response after administration of the sympathetic pressure hormones. The peripherally conditioned effect is a constriction of the smooth muscles in the blood vessel wall, but there is no inhibition of the adrenalin and noradrenalin effects. Both reflectorily and peripherally conditioned effects persist for one or more hours. The baroreceptor reflexes are not inhibited and the vasoconstriction does not necessarily lead to a rise in blood pressure in the normally innervated organism. The doses needed seem to be very small, possibly less than the customary therapeutic doses.

It was then of interest to investigate the effect of ergotamine on blood pressure and circulation under spinal anesthesia and ganglionic block and also under normally innervated conditions and to find out the clinical usefulness of ergotamine in spinal anesthesia. Chapter 3 contains an account of the author's experiments with ergotamine in the rabbit, the cat, and in man. The decreased blood pressure after ganglionic blocking and after spinal anesthesia was raised considerably after 1 to 5 mcgm. of ergotamine tartrate/kgm. of body weight in the rabbit and the cat, or the blood pressure fall was to a great extent prevented by ergotamine premedication. The effect of ergotamine on the blood pressure and circulation in man under high spinal anesthesia, as studied in an earlier investigation, is summarized. The effects of ergotamine demonstrated therein seem to be peripheral, producing vasoconstriction and a redistribution of the blood to the lungs with increased blood pressure and a tendency to normalize the abnormal circulation and thus produce an increase in the stroke volume and in the cardiac output.

On 10 healthy male subjects an investigation was made of the changes in systolic and diastolic blood pressure, pulse rate, and urine excretion of catecholamines in tilting tests before and after administration of 1.5 to 2 mcgm./kgm. of body weight of ergotamine tartrate. After the ergotamine was administered, the systolic blood pressure was largely unchanged or slightly raised, the diastolic pressure was slightly raised, and the pulse rate was somewhat decreased. The adrenalin excretion was not affected in any definite direction, whereas the noradrenalin excretion decreased significantly. It is presumed that this dose of ergotamine gives such an extensive peripheral constriction of the blood vessels that a blood pressure rise could occur; this, however, is compensated by baroreceptor reflexes still functioning normally after the ergotamine doses administered, with a decrease of the endogenous noradrenalin production as the consequence. The adrenalin production is not affected. The possibility of a central and cardiotropic effect is discussed, but the existence of such an effect is regarded as not very probable.

The last chapter is a review of the clinical material. Ergotamine tartrate in a dose of 0.1 to 0.125 mgm. was given intravenously or subcutaneously at the induction of spinal anesthesia for the prevention of blood pressure fall. Even in high spinal anesthesia ergotamine seemed to give satisfactory protection against the blood pressure falls which could be attributed to the anesthesia. The doses used seem to have a long lasting effect without producing any pronounced tendency to raise the blood pressure above normal limits. The pulse rate had a tendency to decrease. The clinical use of ergotamine, then, gave results in the same direction as those obtained in the experimental investigations. In the clinical material no cardiac complications were observed, although several patients were of advanced age. In 2 patients there was a change in heart action from a preanesthetic partial atrioventricular block to a regular heart rhythm.

From the results reported in chapter 4, it was concluded that ergotamine tartrate used with spinal anesthesia acts in agreement with the experimental results reported in chapter 3. Ergotamine is considered to be a very useful agent for preventing blood pressure falls and is without noteworthy side effects.

—*Mary Frances Poe, M.D.*

RADIOLOGY

DIAGNOSTIC ROENTGENOLOGY

The Role of Diagnostic Roentgenology in Medicine. MAX RITVO. *N. England J. M.*, 1960, 262: 1201.

SINCE THE DISCOVERY of the roentgen ray in 1895 constant progress in its development as a practical medical tool has contributed immeasurably to the radical change from the empirical medicine practiced in the nineteenth century to the scientific medicine practiced today.

In every system of the body roentgenographic studies contribute to the diagnosis and treatment of disease. Reliability of the method varies with the type of disease and its stage of development, and the roentgenographic findings require correlation with clinical and laboratory data for optimum application.

Radiation has potentiality for harm which can be classified under four categories: (1) leukemogenesis; (2) carcinogenesis; (3) shortening of the life span; and (4) genetic disturbance.

Early reports concerning the leukemogenic effect evidenced by increased death rate due to leukemia in roentgenologists have been proved at least partly in error when analyzed more carefully, and current studies indicate that the incidence of leukemia in roentgenologists is decreasing, whereas in other doctors, nonradiologists using roentgen rays, it is increasing.

Carcinogenesis as observed in the hands of those working with roentgen rays has been due to failure to take proper precaution.

The life span has actually lengthened during the three generations in which roentgenology has been used medically and it is probable that the greater accuracy and promptness in diagnosis afforded by the use of roentgen rays have contributed more to lengthening the life span than deleterious effects have detracted from it.

Genetic implications are not clearly established in man.

In the United States there are 125,000 users of roentgen rays, of which only 5 per cent are roentgenologists. Harmful results are avoided by the application of correct techniques and proper safeguards. Although it is true that all uses of roentgen rays have potentiality for harm when used by untrained individuals, it is neither desirable nor feasible to eliminate the roentgen ray from modern medical practice. It is desirable to be certain how and by whom the radiation is used.

Roentgenology has made a special contribution in teaching both normal anatomy and pathology, and the teaching responsibility includes the obligation to teach nonradiologists the indications for use of the roentgen ray examination or therapy, capabilities and hazards of the methods, and general descriptions of techniques of practical methods.

Recent technical advances include transmission of roentgenograms by television, image intensification, cineradiography, laminagraphy and xeroradiography.

Research continues in all branches of the field. An interesting possibility for the future is automation in roentgen diagnosis, possibly combined with scanning devices to measure densities on films.

—Lois Cowan Collins, M.D.

Roentgenologic Examination in the Differential Diagnosis of Recurrent Vomiting in Early Infancy (Die Bedeutung roentgenologischer Untersuchungsmethoden fuer die Differentialdiagnose des rezidivierenden Erbrechens im fruehen Saeuglingsalter). K. H. SCHÄFER. *Münch. med. Wschr.*, 1960, 102: 1233.

SERIOUS ORGANIC CHANGES, as well as transient disturbances of the complicated esophagogastric relationship, can give rise to continuous vomiting. While diseases such as hypertrophic pyloric stenosis can be diagnosed clinically on the basis of a characteristic symptomatology, there are other entities such as an internal or external duodenal stenosis which can be suspected clinically but diagnosed exactly only through roentgenologic examination. The possibilities, limitations, and indications for roentgenologic examination as a diagnostic means in children are investigated.

The most important causes of continuous vomiting in the first few weeks of infancy are: spastic hypertrophic pyloric stenosis, adrenogenital low-salt syndrome, external and internal duodenal stenosis, distal intestinal stenosis, recurrent volvulus, esophageal stenosis, diaphragmatic hernia, and so-called habitual vomiting. The duodenal stenosis as well as the stenosis in the distal parts of the intestine requires roentgenologic diagnosis. Prior to each roentgen examination of a young infant careful consideration should be given to the question whether the value of a clearer diagnosis outweighs the unavoidable radiation risk.

In spastic hypertrophic pyloric stenosis the clinical findings in the majority of cases are so typical that roentgenologic diagnosis may be dispensed with. On the other hand, there are instances when only roentgenologic examination quickly and gently clarifies the diagnostic situation and probably protects against unnecessary operation. Roentgenologic examination is indicated in suspected duodenal stenosis, deeper intestinal stenosis, or anomalies of the esophagus such as diaphragmatic hiatus hernia. It should, however, be stressed again and again that the roentgenologic examination, if performed by an experienced person, represents only a negligible and justified radiation risk for the infant. *—Andrew P. Adams, M.D.*

Angiography of the Internal Carotid with Use of the Catheter Technique. P. ELFVIN. *Radiology*, 1960, 75: 80.

ANGIOGRAPHY of the internal carotid artery performed by passing a polyethylene catheter through the common carotid into the internal carotid artery has several advantages over the more commonly used direct percutaneous puncture of the internal carotid. On the basis of 124 studies performed by this method, the advantages are summarized as follows: (1) The

risk involved in intramural and extravasal injection is eliminated. (2) Positioning for special procedures is facilitated. (3) Study of the common and external carotid arteries can be performed without renewed puncture. (4) Combined with the use of pressure syringe and film changer, this method permits personnel to remain outside the examining room during the exposure.

The disadvantage of the method is that slightly more time is required for the sterile arrangement and passing of the guide catheter than for an ordinary percutaneous needle puncture. This procedure required approximately 5 to 10 minutes more after arterial puncture, but this is considered unimportant relative to the advantages gained.

In this series there was only one complication; a 54 year old male patient who had had previous angiography 1 week earlier developed a slight right sided hemiparesis about 20 minutes after the third injection performed with contralateral common carotid compression. The hemiparesis had greatly improved after 4 hours and disappeared completely in 3 days. The series was carefully studied for evidence of arterial spasm around the catheter and this was noted in only 2 patients. In 1 of these it was relieved by advancing the catheter a little farther into the artery. This low incidence of spasm is at variance with the reported experiences of Lindbom and also of Wickbom and Bartley. The author believes that the great difference in frequency of spasm may be due to the fact that the carotid is less sensitive to mechanical excitation than are the arteries of the extremities, which were used in the other series, and also to the use of extensive periarterial infiltration of anesthetic, which probably accomplishes at least a partial sympathetic block.

—*Lois Cowan Collins, M.D.*

Costal Intraosseous Venography, an Aid in Management of Intrathoracic Neoplasia. WILLIAM J. FRY, ROBERT P. SINGER, and JOHN A. TOBIN. *Surgery*, 1960, 48: 229.

DEMONSTRATION of the azygos and hemiazygos venous system by injection of contrast material into the marrow cavity of a rib has been used in 40 patients to determine the resectability of pulmonary and esophageal neoplasm. The azygos and hemiazygos veins lie in close proximity to the hilum of the lung and may be obstructed by infiltrating neoplasm in these areas. This is detected roentgenographically by visualization of the multiple collateral veins which are demonstrable because of reversal of flow in the obstructed azygos vein. Such demonstration of neoplastic infiltration causing obstruction is believed to exclude resectability for cure.

In the 40 patients studied, comprising 7 inflammatory disorders, 21 neoplasms of the lung, 4 cancers of the esophagus, and 8 miscellaneous diagnoses, considerable variation was encountered in the pattern of the azygos and hemiazygos venous systems. These variations have been grouped and diagrammed for clarification of the anatomy. The extensive inflammatory diseases studied did not produce changes similar to those produced by neoplasm. In the opinion of the authors, therefore, costal intraosseous venography is a safe procedure which contributes to the information concerning the resectability of neoplasm in the thorax.

—*Lois Cowan Collins, M.D.*

Faulty Contrast Medium Injection in Percutaneous Ventricular Puncture. BENJAMIN E. GREENBERG and FREDERICK H. KNOX. *Radiology*, 1960, 75: 85.

IN THE COURSE of angiocardiographic studies by direct percutaneous intraventricular puncture, several types of faulty injection of contrast material may occur. Those of principal concern are (1) intramural, (2) intrapericardial, and (3) into a coronary artery.

A total of 42 instances of faulty contrast injection in 437 ventricular punctures has been reported by various authors, including 6 cases reported in this article in detail, and 2 reported fatalities. A third fatality more recently reported was cited in an accompanying footnote.

Intrapericardial injection is apparently innocuous.

Intramural injection causes ventricular tachycardia and may cause heart block or ventricular arrest. The 2 fatalities reported were a consequence of intramural injection. The third type of faulty injection is not specified. One serious complication after injection of the left coronary artery has been reported but cardiac massage averted a fatality.

The authors believe that ventricular tachycardia and certain other arrhythmias of atrial origin contraindicate ventricular puncture.

—*Lois Cowan Collins, M.D.*

ROENTGEN AND COBALT TELETHERAPY

Results of Radiotherapy in Inoperable Cases of Lung Cancer. JYRKI KORHONEN, KALERVO AIRAKSINEN, PENTTI KOSKINEN, and TIMO LEISTI. *Ann. med. int. fenn.*, 1960, 49: 131.

THIS SERIES compares the results in 59 patients given complete roentgenotherapy with results in 53 untreated patients. In the former group, 6 were alive and 53 dead at follow-up and in this group the mean life span in the fatal cases after initiation of therapy was 7.4 months, whereas the mean follow-up period in the living patients was 9.8 months.

Of the untreated patients, 2 were alive and 51 dead at follow-up. The mean life span in fatal cases after diagnosis of the disease was 3.9 months.

It would appear that it is sometimes possible to lengthen the lives of patients with inoperable cancer of the lung by roentgenotherapy, although the results were poor with regards to complete recovery from lung cancer.

—*Ernest D. Bloomenthal, M.D.*

SURGICAL TOPICS OF GENERAL INTEREST

ETIOLOGIC AND PHYSIOLOGIC RESEARCH

Electroencephalographic Changes Due to Cerebral Anoxia in Rabbits (Contribution à un concept de l'anoxie cérébrale). J. CAHN, M. HEROLD, J. ALANO, and P. MATHIS. *Anesthésie*, Par., 1960, 17: 117.

THE AUTHORS investigated several types of anoxia, such as those caused by crossclamping of the aorta, tracheal obstruction, controlled hemorrhage, curarization, and ventricular fibrillation. The cerebral reaction to different types of anoxia was similar.

The chronology of the development of the different electroencephalographic patterns varied. The final electric activity prior to standstill was a more or less rhythmic phenomenon. It was diffuse in the ischemic anoxias and prolonged in hemorrhagic states or after crossclamping of the trachea.

—Karel B. Absolon, M.D.

CANCER RESEARCH AND CHEMOTHERAPY

The Leakage Factor in Regional Perfusion with Chemotherapeutic Agents. JOHN S. STEHLIN, JR., R. LEE CLARK, JR., E. C. WHITE, JOHN E. HEALEY, JR., and Others. *Arch. Surg.*, 1960, 80: 934.

ONE HUNDRED AND THIRTY REGIONAL PERFUSIONS performed by the authors on patients with cancer at the University of Texas M. D. Anderson Hospital and Tumor Institute, Houston, Texas, form the basis of this report. These procedures were performed primarily to study various aspects of chemotherapy in relation to cancer in human subjects and, secondarily, to treat certain patients who had cancer.

The highest possible dose of the chemotherapeutic agent should be administered to insure the maximal effectiveness of perfusion. Although local tissue tolerance is important, the most serious limitation to successful regional perfusion is the leakage factor. This is expressed as a percentage and refers to the extent of cross circulation between the perfused region and the remainder of the body after 15 to 60 minutes of perfusion. The average leakage factor for various sites of perfusion was 5 per cent for popliteal perfusion, 20 per cent for iliac and femoral perfusion, 62 per cent for pelvic perfusion, 80 per cent for external carotid perfusion, and close to 100 per cent for axillary perfusion.

If the leakage factor indicates excessive escape of the chemotherapeutic compound into the systemic circulation, bone marrow depression of varying severity may be anticipated. This generally occurred 7 to 14 days after perfusion. If the concentration of the patient's hemoglobin dropped below 10 gm. per 100 ml., whole fresh blood was given. If the number of platelets dropped below 30,000 per cubic millimeter, platelet-rich plasma was administered.

The authors emphasize the importance of a low leakage factor. They are enthusiastic about the recent addition of a scintillation probe, a rate meter, and a rectilinear recorder. These enable them to determine the leakage factor before and during perfusion. Thus a more appropriate dose of chemotherapeutic drug can be utilized. *—Stephen W. Carveth, M.D.*

Effectiveness of Chemotherapy in Relation to Extravascular Invasion by Embolic Tumor Cells. DAVID L. KINSEY, EDWARD B. PRICE, JR., and ROBERT R. SMITH. *Cancer*, 1960, 13: 733.

THE HISTOLOGIC COURSE of pulmonary metastases of mouse melanoma, S91 Cloudman, is related to the time after intravenous injection of the tumor into the mouse. From 12 to 48 hours after injection, the tumor emboli become established and develop extravascular extensions within the lung parenchyma. Progression of this change, with further invasion and decrease in number of intravascularly located cells, occurs through the twenty-first day after injection.

This study was correlated with information from the literature (Kramer *et al.*, *Surg. Gyn. Obst.*, 1958, 106:427), which showed that the effectiveness of thiotepa in preventing the establishment of tumor emboli is reduced after a 48 hour maximum period. This time interval of 48 hours, beyond which the tumor seems to be refractory to treatment, varies for other types of malignant tumors. *—John W. Braasch, M.D.*

ORGAN TRANSPLANTS

Studies on the Healing of Successful Skin Homografts in Albino Rats. BENJAMIN B. KAMRIN. *Ann. N. York Acad. Sc.*, 1960, 87: 323.

IN 1958, Kamrin demonstrated that homografts could be made to survive for long periods of time by concomitant treatment with pooled serum fractions containing alpha globulins. The present investigation was made possible through the achievement of frequent successful skin homografting of full-thickness skin grafts, including the panniculus carnosus, in Wistar rats. The following aspects were studied: (1) the total growth (weight increases) of normal animals, successfully homografted recipients, and unsuccessfully homografted recipients; (2) measurements of the growth of successful homografts; (3) histologic changes at the junctional areas of the graft and its host; and (4) the changes that occur in the blood serum of treated recipient animals and controls.

Nonlittermate rats were used, care being taken to prevent inbreeding. Pooled rat serum fractions containing alpha globulins were injected intraperitoneally on the day of operation and on the third, sixth, and ninth postoperative days.

The author's experiments led to the following conclusions:

1. The injection of serum fractions containing alpha globulins concomitant with skin homografting maintains the homeostatic state in the recipient. This is shown by the similarity of the serum components in normal and successfully homografted animals when healing is complete, at approximately 55 days postoperatively. It is also supported by the fact that the

animals maintain their weight in the same way as normal untreated animals.

2. Homografts are accepted more frequently when exchanged between animals of the same sex. They usually shrink first and then grow in proportion to the rate of growth of the recipient.

3. Histologic data show that epithelial regeneration and migration from the wound edges of the host commence within 24 hours, and the junctional area between host and graft is covered within 4 days.

4. The appearance of new hair follicles and sebaceous glands and downgrowth of epithelial spurs near the junctional zone suggest that these structures are newly formed.

5. The fate of the grafted panniculus carnosus is uncertain. It appears that some of these muscle fibers may persist and re-establish themselves, but it cannot be ruled out that they may have been an ingrowth from the host's panniculus carnosus.

—*Carl Schiller, M.D.*

Acquired Partial Tolerance to Homologous Skin Grafts in the Human Infant at Birth. R. Fowler, Jr., W. K. Schubert, and C. D. West. *Ann. N. York Acad. Sc.*, 1960, 87: 403.

Billingham established that the injection of leucocytes into fetal and newborn animals can evoke acquired immunologic tolerance to homografts. Postnatal induction of tolerance has been accomplished by leucocyte transfer only in those species of animals who have not passed beyond a critical period or "adaptive phase" in their immunologic maturation. This period varies from species to species, but seldom extends for more than a few days beyond birth. The induction of this tolerance is frequently followed by inimical effects in the immature host, one form of which is "runt disease."

However, large scale transfer of leucocytes to human neonates has been performed by the currently accepted practice of exchange transfusion without apparent ill effect or the development of runt disease.

In the present study, homografting of adult skin was combined with exchange transfusion in 12 newborn infants with hyperbilirubinemia. Six transfusions were performed with stored blood; the other 6 with fresh blood containing viable leucocytes. In those infants receiving blood stored for 48 hours or more, rapid graft rejection occurred. By contrast, marked prolongation of graft survival was noted in the 6 infants who received transfusions of fresh blood and skin from the corresponding blood donor. The mechanism is unknown, but it appears to differ from the tolerance induced by leucocyte transfer to animals in an "adaptive phase" of immunologic maturation since the newborn infant already displays a highly developed rejection mechanism. On the other hand, passive transfer of delayed cutaneous hypersensitivity was not elicited at this age after massive intravenous leucocyte transfer from histoplasmin or tuberculin-positive donors.

—*Carl Schiller, M.D.*

Homologous Composite Tissue Grafts of the Digital Flexor Mechanism in Human Beings. Erle E. Peacock, Jr. *Plastic & Reconstr. Surg.*, 1960, 24: 418.

Vascularization of tendon grafts by blood vessels accompanying fibrous adhesions results in preservation of the grafts, but the adhesions may limit or eliminate necessary gliding motion. Preservation of the elastic membrane and vincula of the normal flexor mechanism results in retention of the gliding motion.

Composite grafts consisting of two flexor tendons and their mesentery, surrounded by an intact digital sheath, were found to survive in animals. The cicatrizing healing process occurred between the host tissue bed and the transplanted tendon sheath, leaving the tendon free within the sheath.

Of necessity, use of composite tendon grafts in humans is restricted to homografts or heterografts because the tendons of the upper extremity are usually unexpendable.

Composite grafts from fresh cadavers were used in fingers of 4 patients with good function resulting in 3 of them.

—*Lockert B. Mason, M.D.*

The Tissue Bank. G. W. Hyatt. *Mil. Med.*, 1960, 125: 523.

Extensive experience with stored bone, skin, fascia, arteries, and dura has been accumulated by the tissue bank of the Naval Medical School, Bethesda, Maryland. More than 12,000 tissue deposits and the use of such deposits in 3,000 patients form the basis of this report. The mechanics of choosing donors, obtaining permission, organization of the bank, and techniques of preservation are reviewed. Freeze-dried grafts offer numerous advantages from the viewpoints of procurement, processing, and long term storage.

The number of grafts used has been as follows: bone 2,361, skin 223, fascia 202, dura 102, cartilage 136, and artery 97.

Among the bone grafts there were 593 successes, 81 failures, and 1,541 cases with incomplete data. Follow-up data on materials other than bone are less complete than those for bone and limited to the observation that results are encouraging.

The author discusses the biology of homografts. He suggests that host response is proportional to cellular viability in the grafted material and that population of graft material with viable cells is a potential surgical disadvantage. He attributes the relative success of bone, cartilage, fascia, cornea, artery, and dura as graft material to a matrix with a rather sparse cell population.

—*Carl H. Calman, M.D.*

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